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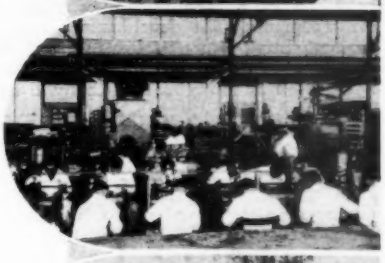

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**PLANT AND EQUIPMENT**—Parks has a capacity enrollment of 310 commercial aviation students and 220 U. S. Army Air Corps aviation cadets. Parks has its own airport, also two subsidiary airports of 96 and 568 acres. A school plant of 25 buildings is devoted to school purposes entirely.

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WITH much Russian military aviation information coming out of that long-secretive land, the one big air power still to be carefully analyzed is Japan. However, in the case of Japan we have had some opportunity — in the Chinese "incident"—to see just what their aerial might amounts to. What we have seen has left us convinced that our Army or Navy air forces could clean them out of the sky in a few weeks. The same feeling, in other words, that most of our Navy officers have in connection with the Japanese navy.

Japanese bombers have blasted dozens of Chinese cities and villages to bits. Given similar circumstances, 100 American lightplanes could have left Chungking in flames. Fact of the matter is that the Japanese air force has yet to face even the nucleus of a strong, modern air force. If and when it does, we fully expect it to be shot out of the skies as fast as it takes to fire the machine guns.

Stories about how the Japanese army, navy and air force "acquired" modern military and naval designs, are legion. But now that the democracies have wakened to the absolute necessity of keeping their secrets secret, the Japanese have had few opportunities to copy modern warplanes. The development of superior fighting aircraft takes the kind of intelligence for which the Japanese have never been famous. We feel this will be brought out sharply once the American pilots and fighting planes, described in the article on page 18, go into action. Then, after the Japanese air force has been crippled, a few air raids on Japan proper should put an end to Nipponese tours of conquest once and for all.

* * *

IF we seem rushed for the next month or two, accept this explanation: we're in the throes of getting together an issue on Navy's aviation—an arm-straining encyclopedia larger than our Army issue.

Not as concentrated as the land-based Army, the Navy is a good deal more difficult to get to. In other words, most of our sources of information and photographs are a thousand miles or so out to this or that sea. So picture us trying to catch up with the Navy — without so much as a rowboat to help.

* * *

OUR article last month, "We Pilots Want Service!" kicked up quite a stir, with the bulk of the mail cheering Edward Churchill for getting many readers' sentiments down in writing. Almost every letter had at least one similar experience to offer.

Not only pilots, but the public wants

(*Continued on page* 122)

FLYING
AND POPULAR AVIATION
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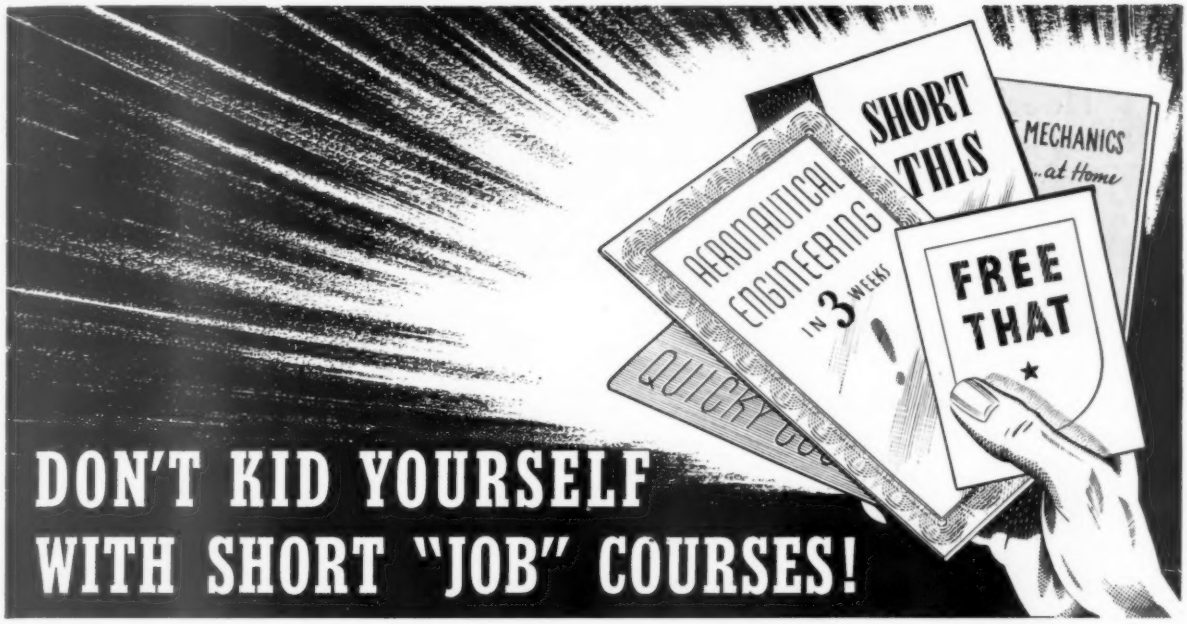


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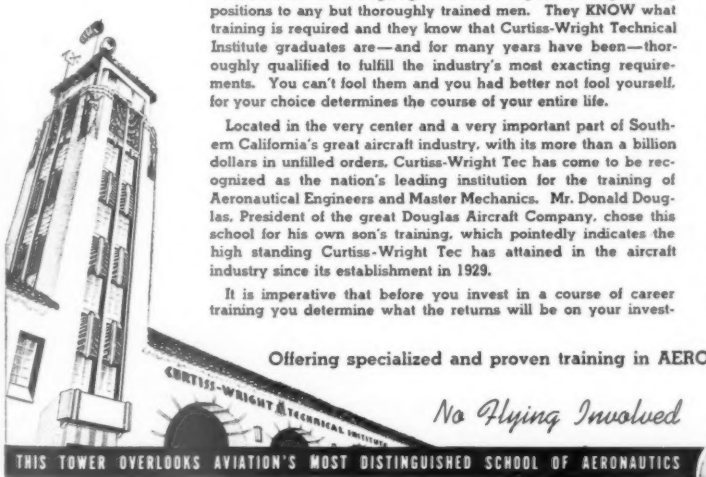


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# Letters

## Appreciation

Sirs:

I read with interest the column ["An Airy Chat With the Editor," August, 1941] on the matter of a separate Air Force. We are fully alive to the vital importance of air power and consequently have studied the matter of its organization in great detail. Your plea for a careful analysis of our present setup rather than its hasty and sweeping condemnation is most practical and I am thoroughly convinced that such an analysis will prove its soundness. Your approach to the problem is very much appreciated by those of us who may have to work with the tools we are now fashioning.

GEN. GEORGE C. MARSHALL,
Chief of Staff,
U.S. Army.

Washington, D. C.

## New Feature

Sirs:

I enjoyed reading Colonel Hartney's column "From Headquarters" and hope that he continues to write as he has . . . we need people like him who have the answers to some of the problems and express them regularly.

R. W. SCHROEDER,
Vice President,
United Air Lines.

Chicago, Ill.

## Flying in Brazil

Sirs:

Sergio O. Hornstein's letter in your July issue made me wonder whether he really has any interest in aviation. He seems particularly impressed by the "wild jungle" that he thinks covers all our country. Well, that "wild jungle" hasn't prevented our having, in the state of Sao Paulo alone, 48 aero clubs in full activity, 135 municipal airports (private fields not included) and 15 regularly-scheduled air routes criss-crossing the state.

Mr. Hornstein shows special concern about the cost of flying here, yet instruction at independent schools costs $7.50 an hour. If this is too high, he can attend a government-subsidized school where he will pay only $4.50 an hour. If a college student, he can apply for a free 20-hour course given by the federal government to any college student willing to learn aviation.

Incidentally, aviation gas is 35c a gallon, not $4.50. Our local *Cub* dealer alone now has orders for more than 60 planes; this shows aviation's popularity here.

Finally, we feel that fearing to fly here on account of the "wild jungle" is as absurd as refusing to fly in the U.S. for fear of being scalped by Indians.

H. ROCHA AZEVEDO, JR.

Sao Paulo, Brazil

Sirs:

The *Escola Pratica de Agricultura "Jose Bonifacio"* maintains a practical aviation course free for its students and professors. The course is given by the state government of Sao Paulo.

JOSE BONIFACIO.

Sao Paulo, Brazil

Sirs:

I was very much surprised to read the letter in your July Issue written by Mr. Sergio R. Hornstein, Sao Paulo, Brazil. . . . As an aviation mechanic in Sao Paulo, let me state that some of his statements are incorrect in my opinion. . . . For instance the whole country down here is *not* covered by a wild jungle. The State of Sao Paulo has more than 150 landing fields a great number of them internationally classified as airports. . . . The price of a Stinson *Reliant* is not $40,000, but $16,000. Gasoline isn't $4.50, but $2 . . . These I know to be facts. In addition, the increase of Civil Aviation here has progressed splendidly in the last 10 years . . . The best North American experts will confirm this.

PEDRO H. SCHAFER

Sao Paulo, Brazil.

● To Readers Azevedo, Bonifacio and Schafer, as well as Sao Paulo's two leading newspapers, our thanks for the facts on Brazilian aviation. However, we would suggest that Readers Azevedo and Schafer get together on the local cost of gasoline.—Ed.

## Pilots or Profiles?

Sirs:

. . . . On July 5 I reported to a flying cadet examining board as instructed for my physical exam. One of the officers took me aside and told me I couldn't become an Army pilot because I had smallpox when I was young and it left scars on my face. He said there was some Army regulation that makes this disqualifying. The board didn't even give me a chance to pass the physical examination to see if there was anything wrong with me.

Please tell me what difference this would make in piloting a plane if the Army needs pilots so badly. Does a fellow have to be a Robert Taylor to make an Army pilot?

ALLEN CHAPIN.

Toledo, O.

● Scars of a "disfiguring nature" are disqualifying for any prospective Army officer, whether Air Force or otherwise, if present in the original physical examination. Such scars incurred after becoming an officer, however, are not disqualifying. Reader Chapin could not take the enlisted pilots' examination as a civilian; he first must join the Army

(*Continued on page* 116)

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# The Birdmen's Perch

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**Major Al Williams, alias "Tattered Wing Tips,"**
**Gulf Aviation Products Manager, Gulf Bldg., Pittsburgh, Pa.**

## FUNNYBONER DEPT.

Dear Major,

It happened the night before the 1938 Oakland Air Show. A banquet was being held for the contestants, officials, and us unimportant enthusiasts.

I had decided to fly a Taylorcraft across San Francisco Bay to Mills Field. The afternoon was dismal and squally, while fog stretched up the Bay, its base at about 100 feet. The tower said that Oakland was wet but that visibility was O.K. So, with fine disregard for the C.A.A. item concerning having both wing tips in one fog bank, I decided to make a quick dash through.

But with my mind more on the anticipation of hob-nobbing with aviation men of great renown than on the 'craft, I never gave the compass a glance. The seat of my gabardines told me I wasn't slipping while my ears reassured me as to level flight.

I flew on, and on, and still no Oakland. Then I glanced at my watch. Twenty minutes had elapsed! Just as I started a little arithmetic, the fog broke, and there before my unbelieving eyes was—Mills Field!

I *know* I had made a 180° turn, but someday I'm going to sit down and figure out how many 360°s I had made. I do know that watching my compass, I should have made the flight in 5 minutes.

*Sincerely*,
**Martin H. Boisen**
Glendale, Calif.

## THIS MONTH'S BRAIN TWISTER

*The following puzzle is sent in by J. L. Centanni of New Orleans:*

Three planes were at New Orleans Airport for refueling with G.A.G. Only a certain amount of gasoline was available. Plane No. 1 took on ⅙ of the gas available; plane No. 2 took 20 gallons; and plane No. 3 took twice as much as planes Nos. 1 and 2 combined. How many gallons were taken?

## FUSSY AS AN OLD MAID

"Fussy fellows" come in for a lot of kidding. You know the type—they're always tinkering, never satisfied that the engine couldn't be tuned a little better, or that a different cockpit arrangement wouldn't be more efficient. Strangely enough, most flyers are like this—they're fussy fellows about planes.

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## THIS MONTH'S WHOPPER

Dear Major,

I had a car, but no more. If your G.A.G. wasn't so good, I wouldn't have flown my car, and if I hadn't flown my car, I'd still have it. Here's why:

I had a new car that would do 114. It seemed so light and smooth that I figured if I flattened out the fenders it would fly.

Well, it wouldn't quite take off, just bumped along the ground. Then I figured that if I was going to fly it, I ought to use aviation gasoline. So I trotted down to the hangar and borrowed 5 gallons of G.A.G. That was all it needed!

The car took off with the grace of a DC-3 and the speed of a P-40. The next day I was driving in town and some idiot wrinkled up my left fender. When I got out on the open road, I forgot about the fender and took off. Immediately I remembered it, 'cause the doggone car started to fly in ever-decreasing concentric circles, until it flew right up its own exhaust pipe and left me sitting on the gas tank 200 feet up. But with the G.A.G. in the tank I was safe as a church. I glided down

to a three-point landing, shouldered the tank, and walked fourteen weary miles back to the field. And that's how I lost my car.

Your footsore pal,
**Max R. Carey,**
Kelly Field, Texas.

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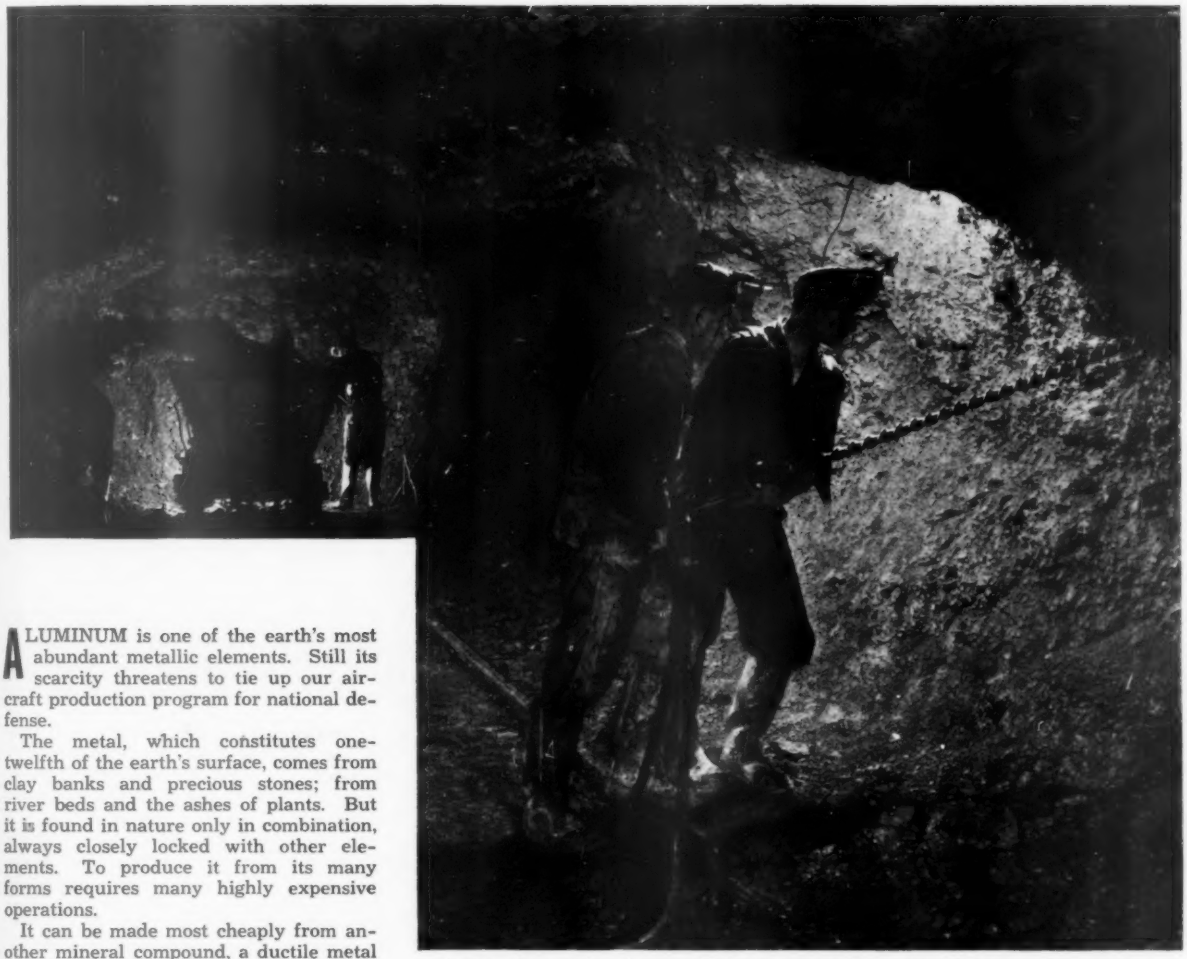
Aviation's most valuable metal must be pure; old aluminum goes elsewhere.

# ALUMINUM:

## MOST PRECIOUS METAL IN AVIATION

by BRUCE BROWN

*Flesh and blood of modern warplanes is aluminum. Its supply is almost limitless. Yet the industry urgently needs 800,000 tons.*



Both surface and underground mining are used to extract bauxite. These miners are dynamiting. Great majority of mining in U. S. deposits is done underground.

ALUMINUM is one of the earth's most abundant metallic elements. Still its scarcity threatens to tie up our aircraft production program for national defense.

The metal, which constitutes one-twelfth of the earth's surface, comes from clay banks and precious stones; from river beds and the ashes of plants. But it is found in nature only in combination, always closely locked with other elements. To produce it from its many forms requires many highly expensive operations.

It can be made most cheaply from another mineral compound, a ductile metal known as bauxite. Without it there could be no aluminum, although metallurgists of the Bureau of Mines are experimenting with an entirely new production method, not yet perfected, which is destined to revolutionize the aluminum industry.

There is plenty of bauxite. It is found in many parts of the world. Chief source of American supply comes from the jungles of Surinam, Dutch Guiana—2,500 miles across the Caribbean. Domestically, it is mined in Georgia, Tennessee, Mississippi and Arkansas which produces about 96 per cent of the ore in the U. S.

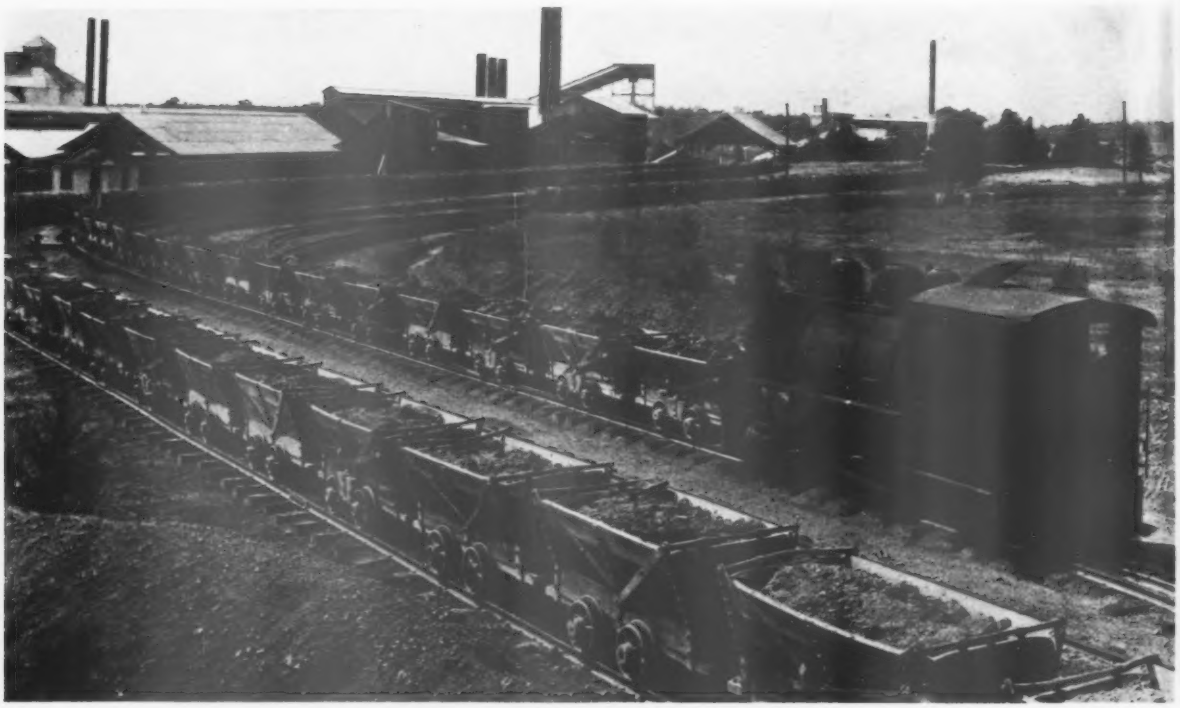
Why, then, the shortage of aluminum?

Until recently the Aluminum Company of America, Pittsburgh, Pa., was sole producer of primary aluminum in this country. Its far-sighted executives were not far-sighted enough to expect the great demand upon the industry created by the current war. G. R. Gibbons, Aluminum Company's senior vice president, recently said:

"The Aluminum Company has been quite wrong in its conception of how much aluminum was needed. But I don't think anybody could foresee what was ahead."

According to William S. Knudsen, the expanded plane program will require an annual production of 1,600,000,000 pounds of aluminum—more of the metal than the

Some bauxite beds lie close to the surface. Power shovels remove earth to get to the ore, which contains about 60 per cent alumina and produces pure aluminum.



Narrow-gauge cars carry ore from mines to bauxite mill where it undergoes first step in processing.

whole world produced last year. In addition, the OPM has announced that it has agreed to allot nearly 2,000,000 pounds of aluminum per month to Great Britain for the next 15 months.

Until recently, the average American was not aware of aluminum's importance. To most people it was just a metal used for making cooking utensils. Others were aware that metallurgists and engineers were expanding its uses. Streamlined trains, milk-bottle caps, electric cables, golf-club shafts, toothpaste tubes, paint—all were being made from aluminum, until the demand for it by the aircraft industry made it scarce for commercial use.

Aluminum is the most vital metal in aircraft production. It weighs only one-third as much as steel, yet it can be given the strength of steel when alloyed with copper, manganese and magnesium in small quantities. It has a high degree of workability making it easy to fabricate. It has a high conductivity of heat and electricity and strong resistance to corrosion, all of which make it ideal for plane construction.

To meet the current objective of the OPM for 800,000 tons of primary aluminum annually for the U. S., approximately 3,143,000 long tons of bauxite will be required. According to a recent survey the known bauxite reserves in this country, consumed at this rate, would last about three and one-half years. By comparison, from 1937-39, U. S. Bureau of Mines' figures reveal the annual domestic production to be 370,000 long tons and average imports at 495,000 long tons.

Bauxite, first discovered in southeastern France on the estate of a French family named Baux (hence its name) is the economically practical key to aluminum today. It is the stuff from which wings, floats, crankcase sections, cowlings, propellers, cylinder heads, housings, pistons, structural frames that make our fighting planes are created. Kitchen utensils are made from common aluminum where the presence of minor impurities, such as a meager amount of iron, has no injurious effect. The strong aluminum, required for airplanes, must have a higher degree of purity.

Duralumin is a German trade name. It is one of more than 20 alloys into which aluminum is compounded. Less than 20 are used industrially. In the U. S., duralumin is known to the trade as alclad. It is compounded of alumina, a small quantity of copper and lesser quantities of manganese and magnesium to give it strength (magnesium is lighter than aluminum, but costs half again as much.)

Duralumin or alclad is made mostly in sheets rolled from ingots. In making the ingots the mold is first lined with pure aluminum so that when the ingot is rolled, the sheet has a thin covering of pure aluminum. Actually duralumin is an aluminum sandwich. This treatment gives the metal protection against corrosion. Thus, in addition to its value as a light material for plane construction, its non-corrosive quality makes it particularly valuable for Naval planes exposed to the corrosive action of salt water. Eighty per cent of the weight of an airplane today is aluminum.

The rich Arkansas bauxite deposits were first discovered in June, 1887 by Dr. John C. Branner, then state geologist, who saw men using the rock during the construction of a road just south of Little Rock, Ark. Mining of the ore did not begin until 12 years later. Since, the mines in this section have produced 10,000,000 tons of ore and their known reserves are 25,000,000 tons.

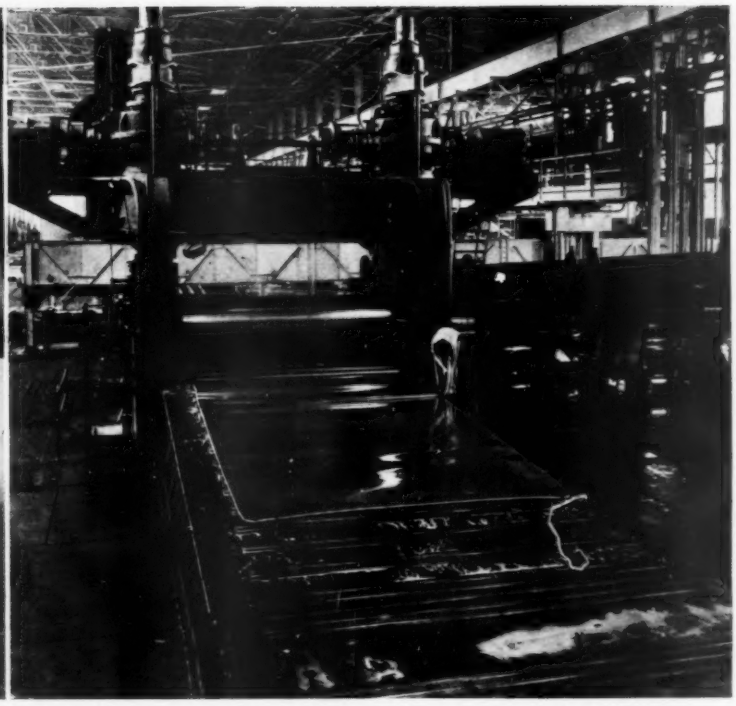
Since Arkansas produces the larger portion of bauxite, the mines in Pulaski and Saline counties are running full blast. Exploitation of bauxite in these counties possibly will be advanced by test drilling now being conducted. The Bauxite Mining Corporation, a subsidiary of Reynolds Metals Company, is concentrating on test drilling. The Reynolds company, however, does not contemplate building a new aluminum plant here because there is insufficient electric power. R. S. Reynolds, head of the company, recently stated that his concern—which this year will bring into production new plants in other sections of the country with a capacity of 100,000,000 pounds of aluminum, could—with Government financial assistance, increase this production figure to 300,000,000 pounds of the metal.

"I understand that probably one-third of the proposed new supply might come from Canada, where there is an excess capacity," Mr. Reynolds said. "The Government should step in with financial aid for private industry to provide the rest of the increase, if American production of aluminum is going to match that of Germany and her allies."

According to reliable sources, Germany and her acquired territories now produce more than 900,000,000 pounds of aluminum per annum, half again as much as the United States at present. Germany surpassed the U. S. in production of the metal in 1938.

The Reynolds Company has new plants at Lister, Ala. (near Muscle Shoals) and at Longview, Wash. (the Bonneville Dam

At bauxite mill, ore is washed free of silica-bearing clay, hammer-crushed before smelting.



Most plane parts are made of duralumin, aluminum alloy sandwiched between pure aluminum. Aluminum Company's press turns out sheets as thin as paper.

area). Both are expected to be in operation by the first of November. Annual output for the two plants will exceed the 100,000,000-pound mark. Further, the Reynolds company has announced the signing of a 12-year contract with N. V. Billiton Maatschappaj, a Dutch Guiana firm, to supply 6,000,000 tons of high grade bauxite with shipments beginning January 1, 1942. The ore, capable of producing 3,000,000,000 pounds of aluminum, will be delivered at Mobile, Ala. The aluminum will be processed at the Lister and Longview plants.

Under a new expansion program the Aluminum Company of America has spent $200,000,000 for the construction of plants. Its forging capacity has been increased approximately 175 per cent; extruded shapes capacity, sheet capacity and tubing capacity have been more than doubled; while wire, rod and bar capacity is up 130 per cent and sand casting capacity now is approximately 200 per cent more than it was at the start of the war in September, 1939.

Plants have been erected at Niagara Falls and at Massena, N. Y., on the banks of the St. Lawrence. Other branch factories have been located in the Southeast where the TVA supplies electrical power, and in the northwest, tapping the electric resources of the Grand Coulee and Bonneville dams.

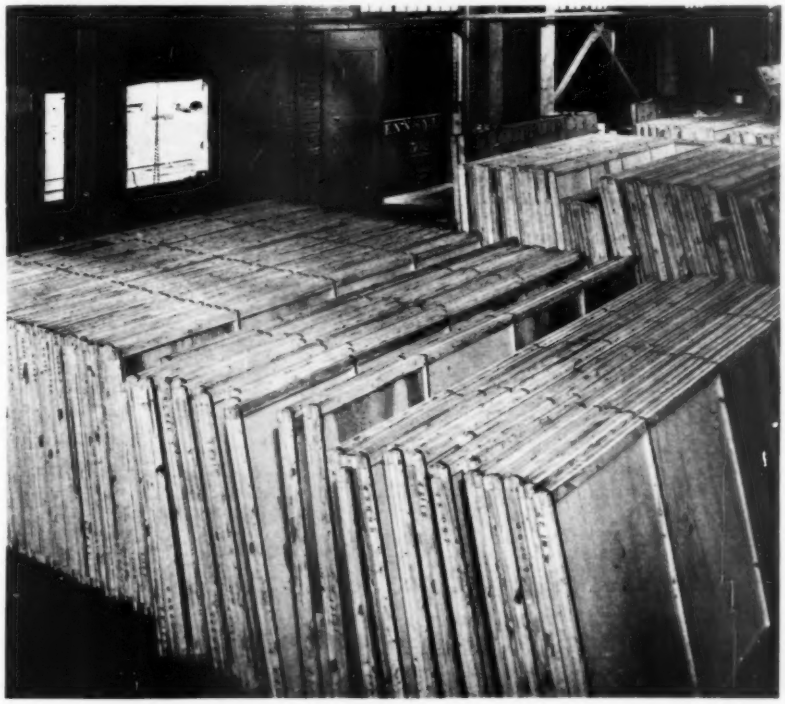
Great quantities of electric energy are required to break down the bauxite and produce aluminum, hence the location of all the new plants in areas where the supply of electricity is plentiful.

The discovery of a means of producing aluminum from bauxite was no accident. Its story is one of a young college student, Charles Martin Hall who, upon his graduation from Oberlin College, Oberlin, O., set out with but one aim in life—to find a means of producing aluminum from bauxite. Bauxite was first converted into pure aluminum oxide or alumina from which comes the vital metal, by an electroyltic process which Hall introduced in 1886. Passing electric current through the ore in great quantities, its other particles were broken apart, leaving only pure aluminum.

National defense officials recently investigated an aluminum production pro-

(*Continued on page 98*)

These dural sheets at Aluminum Company's plant are waiting shipment to Douglas.



LIFE
Besides pilots and aircraft, China now gets modern U. S. arms under the Lend-Lease Act.

China's Generalissimo Chiang Kai-shek in 1932 started mass pilot training program.

Hon. T. V. Soong, who directs U. S.-China Lend-Lease plans, with Madm. Sun Yat Sen.

# America Plays Its Part in the Chinese Air Force

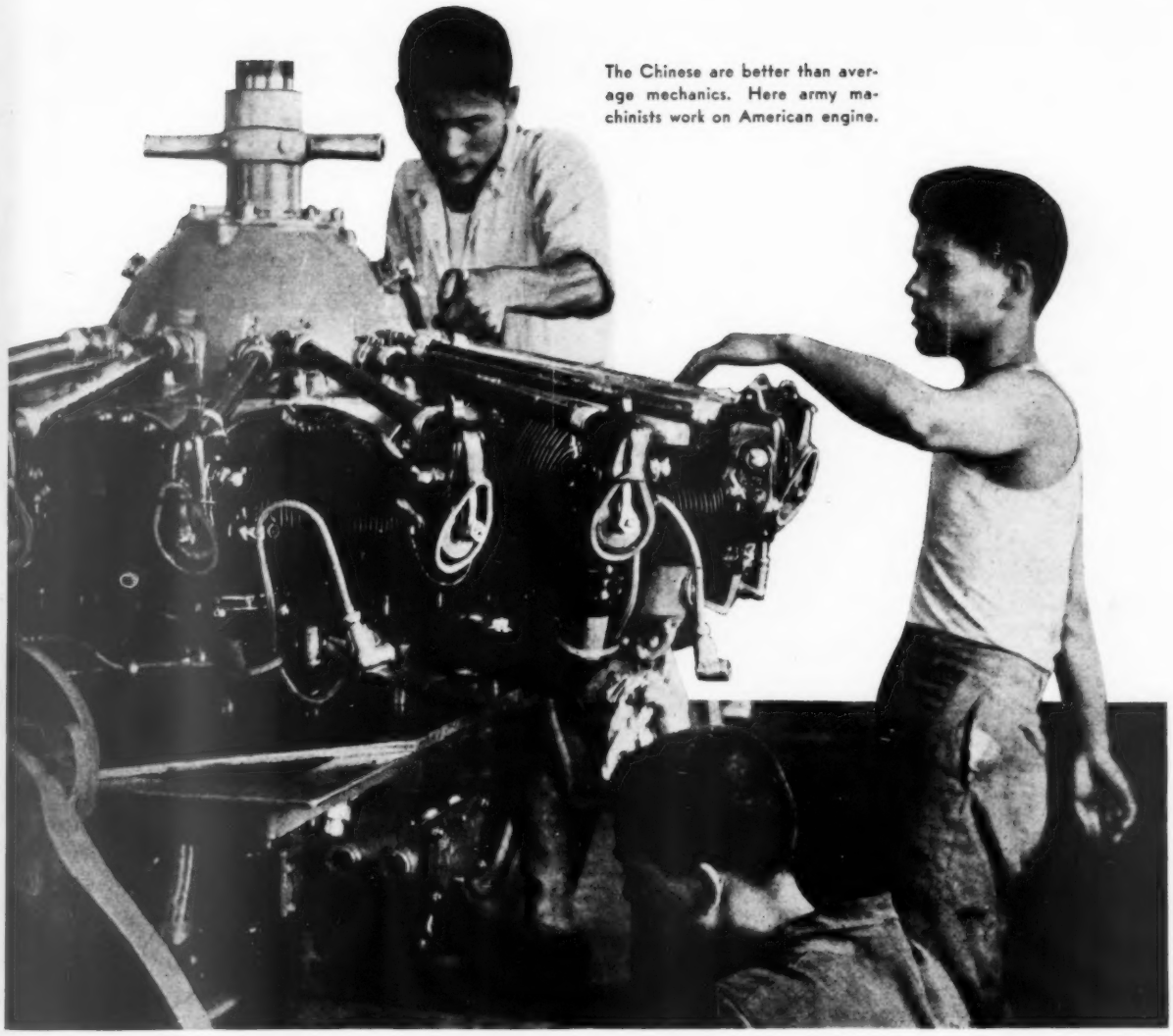
by J. BARTON UNDERWOOD

*China is getting our latest fighting planes to revive her air force. Chiang Kai-shek's airmen are good flyers and ready to fight.*

WITH the recent announcement that the United States has sent aircraft and pilots to the Chinese comes a reawakening of public interest in this gallant people.

The Sino-Japanese conflict might well, without lack of precedent, have long ago been a proving ground for our military and naval airmen. Germany, Italy and Russia used the Spanish Civil War to temper their respective air forces. True, there was plenty of flag-waving on both sides, but the hard cold fact is that for every dollar Germany, Italy and Russia spent in that conflict, they got value received to the tune of two dollars in military preparedness, especially in aviation.

Now we are unofficially sending over our pilots, and officially, our machines. It is no secret. In fact, the Japanese knew it almost immediately. The woman broadcaster from Tokyo back on June 15 told Eastern Asia all about it. She exaggerated it a bit, then went on to tell how the Japanese staged a big raid on Chungking, dropped their bombs, then waited around for over an hour while the city



The Chinese are better than average mechanics. Here army machinists work on American engine.

burned, in the hope that the first of the hundred-odd American planes which had come over to that point would take off. A few days later (about July 1) this same woman spoke of America's penetration into China and speaking largely for the benefit of the Burmese, alleged that we were not only training Chinese but that we were reviving the Chinese air force and establishing bases with *the intention of converting China into an American colony!*

Does the average American realize that the Chinese Air Force last autumn was exactly nil? True they had some 80 unserviceable airplanes, a good many half-baked landing fields well scattered, some schools and a fairly large number of officers, non-commissioned officers, men and depots, but the service as a whole was impotent.

But, in exact opposition to the theory that in modern warfare an army is doomed once it loses its air force, China's army lived on, did not capitulate and remained the sleeping dragon, menacing as ever to the Nipponese. Those who have continually claimed that China cannot be defeated would seem to be correct.

Japan continued to bomb at will. Realizing her complete air superiority in East Asia, Japan intended to lose no time in making the utmost of this advantage. While watching the Russians in the north and waiting for signs of Soviet defeat, Japan simultaneously put out feelers in the direction of Singapore. Her approach to Singapore, geographically speaking, caused alarm in the United States and Britain. Establishing bases at Indo-China, she actually made useless the factory which our own Intercontinent Corporation of New York, with the aid of the Chinese government, had set up at Loiwing, in southwesternmost China, near Burma. After three years it was necessary to move the Loiwing plant into Burma. In a way, China seemed surrounded. The artery of the Burma road appeared cut. Yet China menaced Japan. Killing and burying Chinese to the Japs seemed like sowing dragon's teeth, for they appeared to spring 10-fold into forces against them. To the Japanese it ap-

J. Barton Underwood is a veteran of the first World War. He later attended the U. S. Army Air Service flying schools at Brooks and Kelly Fields, Texas. After nearly five years' service in Manchuria under Marshal Chang Tso Lin, instructing and advising in aviation, he returned to the United States. A short sojourn in Hollywood, making aerial pictures, preceded the maintenance of a charter air service for various newspaper syndicates.

Back in his native Kentucky he collaborated on the writing of the aviation laws for the State and served as director of aviation. He is at present with the International Television Radio Corporation of New York City, engaged in the perfection of a fog vision device for aircraft.—Ed.

China has many well-trained pilots, most of whom Americans taught to fly. Here is a typical group at Nanking field. Given better planes they are tough in combat.

peared logical that in a country of poor communications, air superiority would grant any conqueror the key to complete control of a vanquished nation. Hitler's tactics seemed to have given results and the Nipponese felt it good policy to take a leaf out of their master's book.

But then, up sprang British opposition to Japan, and aid to the Chinese. Early in this year the United States showed its teeth to the Japanese militarists. Our first thought was to revitalize the Chinese Air Force and it is this undertaking that now constitutes the principal war topic of the day in Asia.

It is up to us to spend considerable sums of Lend-Lease money in China. The Chinese already have one of their best men over here, in the person of the Honorable T. V. Soong. He has set up an efficient machinery for the smooth transit of America's best aviation equipment to beleagured China.

Since 1912, when the Chinese first became interested in aviation, American flyers have been popular in the Middle Kingdom. A British-trained Chinese pilot started the ball rolling when his flight in a French Caudron aroused such enthusiasm that the Chinese government immediately purchased 12 Caudron biplanes.

*The national policy of the people of the United States under the Lend-Lease legislation now assures China that a steady flow of military planes and equipment from America will aid her in her desperate defense against Japan. England likewise is committed both morally and by force of circumstances to the support of China's military effort.*

*The effect would be not only to strengthen China but to open up a new Asiatic front to the democratic forces in the event that Russia collapses. Allied strategy in the Far East is dictated by two imperative considerations: one is to keep Japan occupied so as to prevent both an attack on Asiatic Russia and the islands of the South Seas; the other to guarantee the continuation of a two-front war in the struggle against Nazi Germany.*

On the whole, Chinese dabbling in aviation is not a good picture. It is far from being in keeping with the Chinese nation in itself. By the time of our own Armistice, November, 1918, they had trained a total of 100 pilots and had built up a naval air establishment at Foochow.

After World War I—about the time our own Assistant Secretary of the Navy "Ned" Denby, who was visiting China and, piloted by Carl Dolan (former Lafayette Escadrille pilot), made a forced landing on the Great Wall in a British Vickers *Vimy* bomber—Americans became a part of the instructional staff of the then growing but still tiny air force of China.

Forty Vickers *Vimy* bombers, six Handley Page passenger planes and 65 Avro trainers were purchased and set up. British, French and American instructors were engaged. Many of them were excellent, but too many nationalities spoil aviation training. The school at Nanyuan, near Peking, not getting on too well, was interrupted by the civil wars following in the early 1920's. Warlords Chang Tso Lin, Wu Pei Fu and Feng yu Hsiang, the "Christian General," were holding sway in the north. Of the three warlords, Marshal Chang Tso Lin of Manchuria had the best air force and used it to the best advantage in the continual wars in the north. The publicity of the plane in aerial warfare in many cases intrigued these warlords, just as it has many a business magnate or nouveau riche, for pleasure purposes here and it became the hobby, but not the weapon, of most of them. Each chose his own pet source of supply and, of all the conglomerate assortments of flying machines that ever graced the flying fields of any country, China's was the worst. None of its planes was technically fit for combat service. In the civil wars, however, the very appearance of an airplane was sufficient to make an army run.

Such was the hodge-podge when our own Col. "Jack" Jouett was selected in

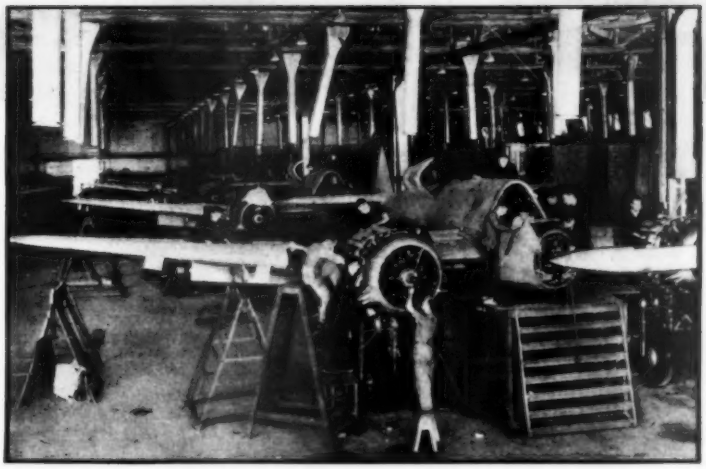
(*Continued on page* 86)

Once China had more assorted warplanes than any three nations. Above are U. S. Vought "Corsairs."

# Beaufighter

Primarily a one-place fighter, the "Beaufighter" can carry second man, with guns, in rear turret.

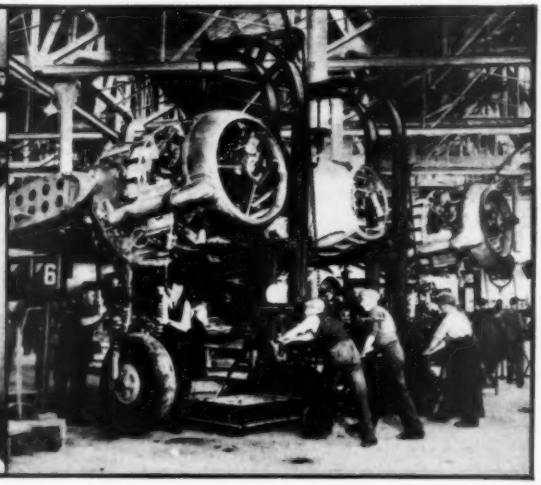
A FIGHTING airplane if there ever was one, the Bristol *Beaufighter* is just about the deadliest warplane ever produced by the British. Standard armament is four 20 mm. cannon in the stub nose and six .303 caliber machine guns in the wings. Far from the old conception of the small, waspish fighter, the *Beaufighter* weighs more than 10 tons loaded. It is powered with two 1,400 h.p. *Hercules* engines which give it a top speed of 330 m.p.h. The toughest airplane the Germans have yet faced, the *Beaufighter* is an excellent night fighter, can cruise 1,500 miles. Service ceiling is 28,900 feet. Span is 57 ft. 10 in., length, 41 ft. 4 in., wing loading, 46 lbs. per sq. ft. Its landing speed is between 70 and 8 m.p.h.



Though only recently announced, the "Beaufighter" already is in mass production at the Bristol factory. Its design is similar to famed "Beaufort."

Large numbers of women have replaced men on "Beaufighter" production line. The all-metal, monocoque fuselage is built in three sections.

Engines are installed. Ship has novel pilot escape hatch under cockpit, permitting parachute jumps up to 400 m.p.h.



# WOMEN CAN FLY

These British women flyers have done some outstanding work ferrying new aircraft.

by JOHN R. HOYT

This heated controversy comes up again, with the author—a veteran flight instructor—giving some facts that should please the ladies.

OUR women pilots should be encouraged to fly, not only for the example they set, but for their value in national defense when those extra pilots may spell the difference between victory and defeat.

We need pilots desperately in this period of national emergency and women pilots can be used for special jobs, just as the women pilots in Britain are doing their bit, ferrying planes to airdromes, flying cargo planes and ambulance ships.

There are many women in the U. S. with hundreds of flying hours to their credit. The Civilian Pilot Training Program is training more. Should we put them to work, or should they be regarded as "just some more women pilots"? The question should be settled.

Are they capable? According to CAA inspectors, young women who have taken their flight examinations from them fly smoother, are more conservative and cautious and more anxious to learn than men pilots!

Perhaps the best approach to the question is through records women pilots have made during and after training. The period following solo consists of their safety record, exploits or achievements and the use to which women pilots are putting their knowledge today.

Training is the choice field for investigation. It affords opportunity of finding out about women pilots from instructors who should be able to tell more about them than anyone else.

Recently about 100 questionnaires were mailed to instructors in various parts of the United States. Women instructors were contacted. But the majority of answers came from men. A surprisingly unbiased set of opinions was obtained.

Instructors were fair in appraising girl students. Here and there appeared a touch of that old-fashioned "woman-driver" attitude, but there were reasons.

Covering the country west to Corpus Christi, Tex., and north to Detroit, Mich., an increasing interest in aviation on the part of women pilots was evident. In Michigan a 60-year-old grey-haired grandmother holds a private pilot's certificate and takes jaunts to Miami, New York or Seattle alone! When she first applied for a license she could not quite handle her J-4 *Cub* in a steep bank—and failed the test. The second time she could not land it accurately on a designated spot. The third time she was letter perfect in all maneuvers.

One CAA inspector remarked:

"I'd rather give her a ticket than one of these 'hot shot' lads who won't work for his license, or who accepts a failure with implied prejudice against the inspector."

This "will to learn" spirit favors the American aviatrix. She is more sincere, works harder for what she gets, than her male rival. Failing a test, she goes out and really prepares herself for the re-examination.

Instructors claimed in the questionnaire that they would rather not instruct girls, if given a preference, namely because women couldn't take criticism as well as men. Girls sometimes pouted when criticized.

Being over emotional is a disadvantage to women in aviation. This is the greatest mitigating factor regarding women pilots. As a result of this emotional characteristic most instructors voted (16 to 3) a preference for male students.

A flight examiner in a mid-western states reports:

Jacqueline Cochran, a typical aviatrix, has flown "tough" ships, from fighters to bombers.

Heroine of all women flyers was Amelia Earhart, who was as capable as most men.

"One girl student of mine had gone through her flight test satisfactorily with the exception of her last spot landing, which she had messed up. I let her try again and on the second shot she just made it. After pointing out the obvious error in technique, I remarked paternally that she should fly conservatively, not carry passengers and forget about celebrating her new ticket by stunting illegally."

The girl seemed dumbstruck, according to the examiner.

"Does that mean that I *passed*?" she asked. "Do I get my license?"

"Sure," was the reply.

Whereupon the new private pilot burst into tears because, she explained, "Gosh, I am happy!"

Those points must not be taken as an

indication that women can or cannot fly. Neither should the fact that they require more instruction be taken as a criteria (15 to five said women took more instruction prior to solo than men). For one thing, girls go to the airport very seldom and it has been estimated by a survey that only one girl in 10 is really interested in aviation. Few girls take a toy apart, build model planes, or become skilled in wagon, skates, bikes, or sports requiring physical coordination. Early training and natural aptitudes lessen their chances for early solo.

Does that mean that a good aviatrix is not feminine? That she is the rowdy-tomboy type? By a vote of 80 per cent instructors agreed that girls who flew were average, feminine young ladies. There were just as many of the masculine variety as the more retiring type. The vote revealed that any girl who had previous training or experience with mechanical gadgets was more likely to succeed in aviation than her doll-loving sister. The outdoor girl, who had learned to coordinate her muscles in outdoor activities, stood a better chance of soloing.

The two worst features of women flyers, the questionnaire showed, is the lack of tendency to accept criticism without crying and their lack of ability to act in an emergency.

There is the case of one pilot, cited by a CAA inspector, who seemed intensely interested in aviation and who accumulated her time in the air by 30-minute hops, purchased as she could afford it. She had a good "feel" of the plane and soloed in about 10 hours, or average-plus.

In due time she began her cross-country work and her practice for the private pilot's examination. During the simulated forced landing work she exhibited indecision plus a slight erratic behavior. Finally, her instructor put her up for check with the inspector. Everything went fine until he gave her a simulated emergency landing. When the throttle was snapped shut she sat perfectly still for several seconds, then blundered by turning abruptly downwind.

It is impossible to fail a person forever because of one poor emergency landing, and after constant drill in such work the girl finally passed her test. But there was always a doubt in the inspector's mind as to the young lady's dependability in a crisis.

The question of women's reaction in emergencies was asked in the survey in the form of several queries. Here are the results:

Do outdoor girls fly better than the "indoor" type?—Yes: 90 per cent.

Do they become more tense than boys in emergencies?—No: 80 per cent.

Do they react, as a rule, less convincingly?—Yes: 85 per cent.

Can they be taught to react favorably in a reasonable amount of time?—Yes: 85 per cent.

Are women inclined to blow up in emergencies?—No: 70 per cent.

Do they blow up more than men?—About 50-50.

(*Continued on page* 108)

# U.S.-Canada Air Base Chain

by MORTON L. BENNETT

*Our lines of aerial defense extend from the U.S. to Alaska through Canada. Hence these large new bases.*

SEVEN new air fields, each capable of handling the largest aircraft, are being rushed to completion across British Columbia. The fields are designed to connect Alaska with the United States and will cost approximately $15,000,000. They will enable American fighting planes to reach the northern outposts in less than 24 hours from Seattle or other Pacific coast bases.

The new fields are not glorified cow pastures scraped out of the wilderness, but up-to-the-minute air bases, each capable of accommodating several squadrons of modern bombers or fighting planes. Set in the heart of North America's wildest regions, they are equipped with mile-long runways sufficient for heavily loaded planes to take off from in any direction.

Each field has machine shops and repair facilities to furnish a complete maintenance service for fighting ships of all types. Flood-lighting makes possible night operations. More than 1,500 men, some American technicians, are working 24-hour shifts to get the Canadian chain in operation.

The Canada-U. S. Defense Pact isn't new. Dr. Charles Camsell proposed it in 1936 when, as Deputy Minister of Mines, he surveyed the district. His suggestions were acted upon in 1939 when Pan American Airways experimented with Alaska flights.

The Pan American experiments took place along the coast route. Fog and prevailing storms made the scheme impractical. The only reliable all-weather route was that surveyed by the Canadian government through British Columbia's rugged interior. Protected by mountain ranges east and west, the route was ideal for military or commercial purposes.

Running east and north of the towering Rockies, the entire route is well sheltered. A Canadian commercial company, the Yukon Southern Air Transport, has been running a 100 per cent schedule through to Whitehorse. They have collected valuable data and submitted it with suggestions for the improvement of the route, to Pan American officials.

Pan American engineers expressed satisfaction. They offered to finance the construction and equipping of adequate air fields if the Canadian company would cooperate. Agreement was reached and the project started.

Outbreak of war accelerated developments. Canadian and U. S. military officials created the Canada-U. S. Defense Pact. New fields were now of military nature. Their speedy completion was essential.

Pan American radio technicians were installing radio beam equipment when the pact was born. Their forces were augmented by Army men. Surveyors and construction engineers were flown into the country to make arrangements for the hosts to follow.

Heavy machinery and supplies were taken in to rip huge tracts out of the mountains. Roads were constructed to allow the passage of such heavy equipment. In the opinion of experts it would take at least three to five years to complete the project.

The initial part of the route, Vancouver, B. C., to Prince George, was easy. But from Fort St. John north to Fort Nelson, a road had to be built—400 miles long through bad country. Even while the engineers were contemplating this task, a Pan American Douglas DC-3 landed at Prince George on an inaugural flight.

Caterpillar tractors, equipped with bulldozers, started out from Fort St. John. In sub-zero weather these machines gouged their way through the wilderness over a path blazed by men with dog teams. Behind came other tractors towing trains of sleighs. In 59 days that 400 miles of road had been smashed through. Before the "cats" arrived at Fort Nelson motor trucks were roaring over the road hauling tons of supplies.

Initial estimates had provided for a cost of $5,000,000 and about 1,000 men. Wartime emergency boosted the costs to $15,000,000; the number of men to 1,500, backed by a supplementary force three

(*Continued on page* 122)

This is the DC-3 at Prince George, B. C. Note the heating hood covering left engine.

# Adventurers' Airline

Latest Bahamas Airways ship is this Grumman "Widgeon" (G-44) amphibian, taxiing up ramp at Nassau.

by EDWARD CHURCHILL

*There's nothing very monotonous about the company Charlie Collar operates. His kind of flying helped make our airlines what they are today.*

THERE was generator trouble on the motor cruiser *Iolanthe*, out of Nassau for Salt Cay, British West Indies, 450 miles away, with eight members of a motion picture company's technical crew aboard. Most important was Leo Tover, chief cameraman. Shooting of the picture, "Bahama Passage," was to begin in less than 24 hours and Tover had to be on the job.

Radio told the *Iolanthe's* troubles to Nassau. Capt. Charles Collar, leather-skinned, blue-eyed skipper of Bahamas Airways, Ltd., turned over the twin motors of his Douglas *Dolphin*, lifted the big amphibian off Nassau's still blue waters. An hour and a half later he landed beside the *Iolanthe*, picked up the men.

Tover and the others arrived at desolate Salt Cay and camera motors hummed on schedule. Collar whipped his Douglas back to Nassau, prepared for another 450 mile run between Nassau and Salt Cay, carrying fresh meat, vegetables, equipment.

Collar, who is 40, but looks about 35, is a quiet individual who gets things done. He has the knack of keeping his equipment ready to go at a moment's notice. His Douglas, the sleek Grumman amphibian with its twin Rangers, and a Luscombe trainer, always are ready to hit the deck.

The "out islands" and Nassau depend on him. That's why, in eight years, he has been able to parley a single Keystone *Commuter* into the three ships mentioned above. That's why, when anything goes wrong in these tropic waters, there's an emergency which might be anything from childbirth, hurricane disaster, or accident to death itself, the call goes up:

"Get Charlie Collar!"

Sometimes it's charity. A government physician must be rushed to Rum Cay. A native, destitute, will die on Andros if Collar doesn't fly him in to a Nassau hospital. Again, it's big stuff, with the Duke of Windsor, governor of the Bahamas, going aboard with a party for the Air Races at Miami. Sometimes it's odd, with Collar flying Betty Carstairs' ailing dog from her Whale Cay domain to a Miami pet hospital.

"The secret of operating my kind of airline," Collar says, "is to find a spot where the airlines don't go and then select a place where ground transportation can't keep up with you (the boats around here average 10 m.p.h.) and keep your equipment ready for anything."

Maybe you noticed that this article is called "Airline." Bahamas Airways, Ltd., runs twice-weekly excursions from Nassau to outlying islands and from Nassau to Palm Beach during January, February and March, height of the tourist season. But most of Charlie Collar's work is charter. In eight years, flying his characteristic 50 feet off the water through squalls, thunderstorms, sunshine and muck, he has travelled an estimated 500,000 miles without a forced landing of any kind.

Charlie never stacks a crate. He retires it. The Ireland boat that was here when he arrived, the Loening *Air Yacht* he proudly purchased shortly after he took over at Nassau, and the old *Commuter*—all are out of service. Nothing's busted on 'em. They're just too tired to go places any more. Bahamas Airways doesn't know the meaning of motor trouble.

"This motor business is a lot of work," he says. "You've got to have good men. You've got to be on your toes. There's something wrong with, and something to be watched on, every flying boat, pontoon job or amphibian that was ever built. Some day, somebody is going to build a

Charlie Collar (left) poses with Edward H. Griffith, Hollywood producer-director. Collar's planes speeded production of Griffith's latest picture, "Bahama Passage."

perfect water job. But that day hasn't arrived yet."

Navy-trained, Collar was strictly alone when he arrived in Nassau in 1933 with his *Commuter*. He bumped into bad news. Aviators and aircraft were in bad repute. The last pilot had been a nipper and had done most of his flying in Nassau bars. He had forced landings, motor failures and just about every accident in the book. He'd left a lot of bills.

"Nobody liked me," Collar says today, with a grin.

Collar sold himself to the Nassauvians after a year of missionary work. He's most grateful to Harold G. Christie, local real estate operator, who sells everything from a small house and lot in Nassau to an entire cay 80 miles away.

"Nobody would ride with me but Christie when I first came in here," he says. "Christie looked ahead and he saw that he couldn't sell islands if he couldn't point out that there was fast, reliable transportation to the prospects. He kept me alive the first year. He talked around, praised my work, interested others and in 1934 the business really started to take hold."

The history of Bahama's flying is brief and sketchy. Prior to 1920, a check-up shows, there was no flying operation of any kind. In that year or thereabouts, Aero Limited of Miami started excursion trips and picked up a few charters out of Nassau, using converted Navy F5L's. In the next few years bootleggers were in, out and around plenty, but most of their actual operations were from Bimini west to the United States. Harry Rogers, during the '20s, sent planes over for a few seasons, did a sporadic business. A. B. Chalk and a number of other Miami operators came and went.

Pan American reaches out from Miami, and Nassau is the end of the line. The four-motored S-40's have pioneered on the run, but DC-3's are taking over the service. They're landing at Oakes Field, two miles southwest of the city of Nassau—a field built by Sir Harry Oakes, aviation enthusiast. Pan American can be called an arm and Collar's Bahamas Airways a hand, extending fingers in all directions of the Bahamas, the Turks and Caicos islands, and on south to Haiti and San Domingo.

Since 1933 Collar has flown west to Miami and Palm Beach, 1,200 miles; southwest to Havana, 364 miles; south to Kingston, Jamaica, 505 miles; south to Port au Prince, 465 miles; north to Walker's Cay, 165 miles; east to San Salvador, where Columbus first landed, 200 miles.

"It sounds tough," says Collar, "this flying around the islands, but it isn't.

"All you need is to get a good compass and trust it. I've flown out a great many times on emergencies looking for pilots who usually are never found. Parts of their planes wash up on lonely cays weeks and months later and give us the bitter answers. Usually, you can put the whole story together.

"It's 'took off, flew by compass, didn't trust compass, tried to correct course, tried to re-correct it, got lost, ran out of gas and went in.'"

Collar, as he says, very seldom finds 'em alive. He did find a land job not long ago. It had landed on a cay. That took seven hours of flying time, with no reimbursement.

Collar acquired the Loening *Air Yacht*. In 1936 he got the Vanderbilt-owned Douglas *Dolphin*. He put on temporary pilots during the rush season, among them Rodney Jackson, Vanderbilt pilot; and Elwood Keim. Three years ago Leon Brink, native of New York, drifted in, hung up his hat and went to work. Brink has been around ever since and probably is the only man in the world who flies with a drawl. He seems to pay practically no attention to the airplane, replies to questions about his nonchalance:

"She just flies herself."

Brink is right-hand-man to Collar. For a while Collar had a very excellent mechanic, Bob Addison, who went off to war. Now he has just as good a worker in John Van Der Minden, ex-Lockheed aircraft worker, 21, New York born.

Van Der Minden serves as flight mechanic on the Douglas. Backing the blond, shock-haired Van are a couple of natives who have been with Collar almost since the beginning. One is Elgin Adderly, who also rides on the right side of the Douglas; the other is Senior Davis.

The natives seldom see Collar riled. But his Navy training says: "Keep 'em ship-shape."

In his career, Collar has had two motors go out from under him. This was pre-Bahamas Airways. The first was a blow-up of a Packard Diesel, one of twins installed in a Towle amphibian he bought. He taxied for five hours with one motor to get to land. The other motor failure came from the carelessness of a mechanic, who left out a cotter pin on one of the Loenings. Collar put five passengers down in the gulf stream, made emergency repairs, took off again.

"That happens to you once, and you don't want it to happen to you again," he says—and means it. The mechanics know he means it.

Collar's innovations in maintenance are unique. Factories might be interested in knowing that he beats corrosion by painting hulls and motors with a mixture of castor oil and potassium dichromate. The chemical combats the corrosion and the oil holds it on. He also uses Parkeltone.

"Corrosion's the battle and you have to keep fighting," Collar says, pointing to Ranger baffles that are on their way out via the corrosion route due to salt water being sucked in through an air intake vent in the front of the motor cowling. "Once it starts, your airplane is gone. Factories don't know how to lick the kind of corrosion we get. And more careful designing would get the motors higher, out of the spray path on take-off.

Operating in British territory, Collar uses the "NC" of the United States, insists on CAA supervision of his equip-

(*Continued on page* 96)

All types of Army planes are in action with troops on maneuvers. These are Douglas A-24 dive bombers.

# Aircraft in the Maneuvers

by B. R. S. HEATHERINGTON

*Planes are stealing the show during America's biggest peacetime war games. Even ground generals praise the Air Forces.*

SHREVEPORT, La.—This is war. Reds in the north versus Blues in the South. There's shooting without bullets from the small arms of the groundlings; there's diving on ground targets and air battles by the airplanes concerned, but nary a bomb is dropped or an aerial machine-gun popped, except during the lull in the war when an exhibition of bombing and gunnery is staged for brass hats and lesser commissioned fry. For these are maneuvers; yet on the largest scale and most realistic type ever held in this country, centered in Louisiana but spilling over into Mississippi and Texas, 10,000 square miles for the ground troops to maneuver in and 60,000 × 5 miles high up (that's 300,000 cubic miles) for maneuver space for the second and third air task forces, plus observation units supporting the second and third field armies in this titanic struggle.

Northeast of the Red River lay the Second Army Reds under Gen. Ben Lear with his Second Air Task Force under Maj. Gen. Millard F. Harmon; air combat units based on airdromes at Jackson, Miss.; Monroe, Natchitches (pronounced Nakitosh) and Barksdale Field, La., and corps and army observations squadrons

(*Continued on page* 100)

Douglas A-20A light bombers are effective against ground troops during mock battles.

# Plane Fish-Planting

Fingerling trout are transferred from truck to plane's tank by bucket. Big problem was in aerating tanks.

by RICHARD MARTIN
Photographs by Charles J. Belden

*Airplanes proved to be the best solution to restocking mountain lakes with fish. Montana's game commission pioneered the practice.*

ONLY a few years ago it was considered the height of angling luxury to fly fishermen to the lakes. Now they're flying the fish in, too.

As a result, hundreds of heretofore inaccessible mountain lakes are being stocked with fingerling trout, each lake destined to become an angling paradise within the next few years. The airplane is doing the job. Aerial fish planting is no new wrinkle in the age-old history of fishing, but it's new enough in this country (its birthplace) to have passed the experimental stage.

With the passage of years the supply of "good" fishing lakes has been decreased by taking more fish out of them than can be put back. Restocking has slowed but not halted this drain. Sportsmen have been forced to travel deeper and deeper into the wilderness in search of virgin fishing spots. Thousands of high mountain lakes offer ideal potential fishing—but they don't have in their waters any native trout or other game fish. Stocking them meant carrying fingerlings over difficult mountain terrain on mule-back. Aeration of carrying tanks under these conditions was impossible.

The airplane proved the solution, and many lakes were the scene of successful experimental fish-planting by air. State game departments and sportsmen's clubs cooperated in devising methods. First they tried dropping fish in containers supported by parachutes. The necessary equipment and the limited number of fish that could be handled proved too costly. Crowding them in the containers made aeration difficult. Considerable shock resulted when the containers hit the water.

Attempting to minimize this shock, experimenters devised a cylindrical container pointed at the bottom so it would penetrate the water. But this way both

water and fish were drawn out the open end by suction during the drop. Examination of the lake waters where the cylinders fell disclosed no dead fish and the idea of dumping fish from a plane free was born.

In October, 1938, members of the Montana Fish and Game Commission rowed out on a small lake near the Billings airport. Herman Hendrickson, sportsman pilot and fishing enthusiast, loaded a can of fish in his plane, flew over the lake at altitudes of 100 to 400 feet and ladled out the fish and water with a dipper. The water was shredded into mist by the propeller blast and the tiny trout went squirming downward, splashing into the lake. Observers in boats saw the fish swim away immediately after striking the water. Fluttering and squirming in the air had cushioned their fall to the extent the fish weren't even stunned.

Heartened by this success, members of the Billings Rod and Gun Club decided to stock some of the inaccessible lakes in the rugged Beartooth Mountains. John Schofield, Montana superintendent of fisheries, decided that 5,000 California Golden trout, a native high-altitude fish, could stand the rigors of life at 10,000 and 11,000 feet. They were furnished by the state hatchery at Big Timber, along with 5,000 Albinos and 5,000 Rainbows.

A Stearman biplane was fitted out as a "fish tank." A 50-gallon tank was built into the front cockpit. A manually-operated dump valve six inches in diameter was fitted in the bottom, with its operating control placed in the pilot's cockpit. Spilling of fish and water in rough air was prevented by a hinged metal cover. Aeration of the water was accomplished by means of a half-inch copper tube leading to the tank from a funnel mounted on a strut. Thus the water was kept well activated by air under pressure.

The first large-scale stocking was accomplished without a hitch and, in July of 1939, the Federal Department of Public Works, Division of Aeronautics, published a report on similar operations carried out in the Stanley Basin region of Sawtooth National Forest.

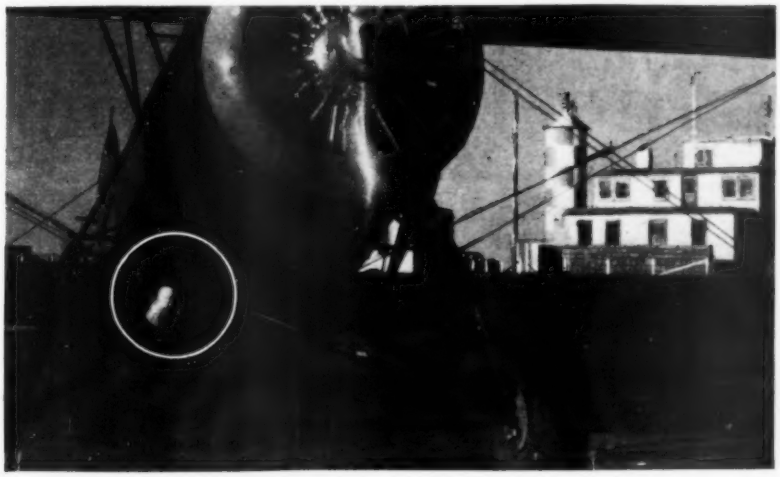
Exhaustive tests revealed the mortality rate of the fish by aerial planting was less than one per cent. The report said "as the fingerlings are perfectly streamlined and light in weight, they reach their terminal velocity very quickly. They always met the water head foremost."

The trout were dropped from varying altitudes, the maximum being 500 feet, with a minimum water depth of three feet. Length of drop seemed to have no increasing effect on the mortality rate. Twelve lakes were serviced in the Idaho tests including Alturas, Alpine, Kramer, Champion, Washington, Baron and Reward. Each flight took approximately 20 minutes and 6,200 fingerlings were dropped each trip, 75,000 in all.

Total cost for rental on the plane, tanks, labor and time was $249.77. Cost per fish planted was 3 and 3/100 mills. It since has been reduced materially. The Federal report drew the conclusions that for future operations of this type it would be desirable to use a plane with a payload

(*Continued on page 112*)

Stearman biplane usually is used by Montana commission. Fingerlings pour through special nozzle in fuselage (circle below) from 500 feet, suffer very few casualties.



Typical of many mountain lakes, that below is almost inaccessible except by plane. Aircraft recently have "planted" a total of 75,000 fingerling trout in 12 such lakes.

Taken from a lightplane, this picture shows scout cars with which plane was working.

# The Lightplane Goes to War

by WILLIAM D. STROHMEIER

*It took many years to convince them, but Army men finally have fallen in love with the lightplane. The ships may revolutionize war tactics.*

W. D. Strohmeier

"NX-5 to Roger Tare 2. NX-5 to Roger Tare 2. Come in please."

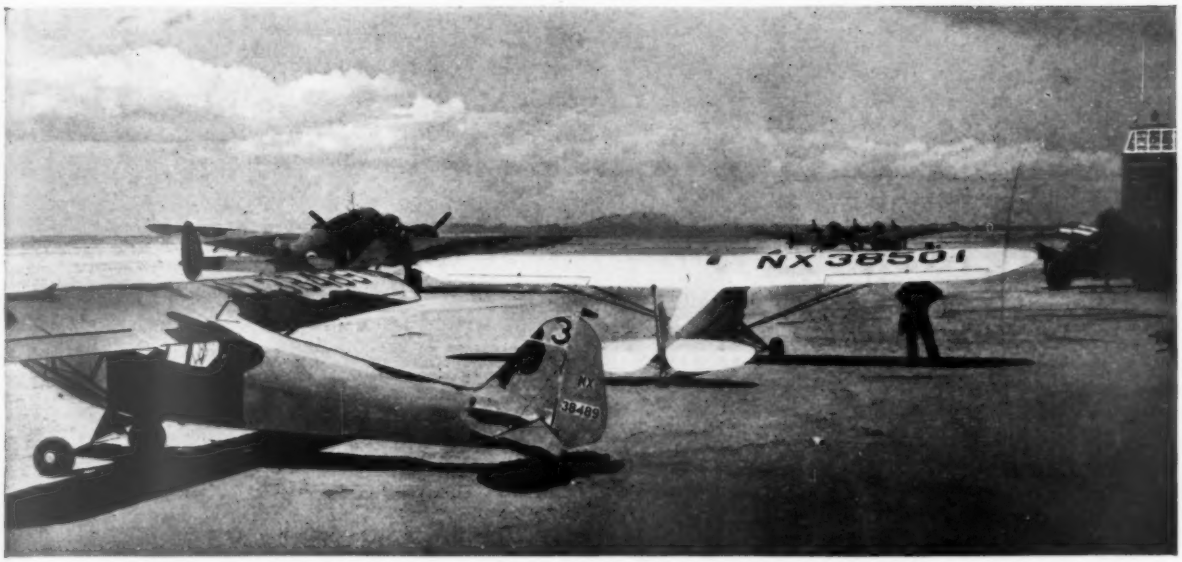
"Roger Tare 2 to NX-5. Go ahead."

"NX-5 to Roger Tare 2. Am two miles north of Flat Tank Charlie at 100 feet. Have located strong enemy mechanized unit two miles north of present position heading south from Campbell well. Will reconnoiter to west and check on possible flank elements."

The scene of this dramatic radio conversation was 30 miles northeast of El Paso in the middle of the New Mexican desert. Roger Tare 2 was the phonetic pronunciation of radio station RT-2, in an armored scout car of the battalion commander, awaiting latest information from his aerial observation. NX-5 was the call letter of a "grasshopper" plane which had only a few minutes before taken off from the narrow rut road beside which the battalion was now parked. Flat Tank Charlie is but one of many quaintly or oddly named watering places for cattle out in the middle of nowhere. All that day the battalion commander had been moving with clear and precise information on what lay ahead of him as the most extensive desert maneuvers in the history of the United States got under way. This information was being relayed to him constantly by the battalion's aerial eyes. Occasionally the commander himself had gone aloft to survey the terrain, for best possible routes for advance. It gave the major, for the first time, the equivalent of a 1,000 foot mountain from which he could look down on any situation, size it up and act accordingly. A new phase in Army tactics was being demonstrated that day.

What kind of a super plane was it that could take off from the narrow confines of a rut road in the middle of the desert, that could fly so low and so agilely that enemy action against it was almost im-

This is NX-5, the "Cub" in our article. The back seat carried elaborate radio.




"Cub" in foreground carried experimental camouflage. Note scheme's similarity to RAF "Hudson" in background.

possible? Oddly enough it was no secret military development, it had no gadgets, nothing special. Instead it was an airplane which 10 years of hard student flying had developed, it was just a plain, ordinary, run of the mill, you-see-them-on-every-airport lightplane with 65 h.p. Of course it was painted that dull olive drab and camouflaged completely, but outside of that—and the very complete radio equipment—it was just a stock light airplane taken off the assembly line of one of the nation's busy lightplane factories.

Here it was that an airplane which had never been thought of as more than a rank primary trainer good enough only to teach numbskulls and flighty maidens how to roam around the airport, was playing a vital role in conducting the largest peacetime desert maneuvers in the United States and making a good account of itself in a role never dreamed of for it by its designer or manufacturer. The little airplanes with their rugged landing gears, time tested by millions of student landings, were bouncing in and out of the blistery desert on runways hastily scraped by Army engineers on dry lake beds, on the sloping sides of mountains, on highways and in the cactus itself. In temperatures ranging up to 115°, in and out of "airfields" more than 5,000 feet high, the little American putt-putt did its stuff and did it well.

At last the lightplane has been given a tough assignment, a thorough testing and it came out with flying colors and with the whole army relating amazing stories of their effectiveness and utility in modern warfare.

All in all there were 14 lightplanes in the Third Army maneuvers held in July north of Fort Bliss on the outskirts of El Paso. The fleet consisted of 10 Piper *Cubs*, two Aeroncas and two Taylorcrafts. All ships were the regular tandem trainers—manufactured by those companies—tandem because they had to carry an observer who had to see out of both sides with minimum difficulty. All the ships were equipped with 65 h.p. Continental engines, which allowed the pilots to land near any truck or tank when out of gas and "swipe" five gallons of low octane fuel to continue their mission. The pilots were civilians sent with the ships by the manufacturers and turned over to the Army command to fly and demonstrate them. For the pilots it was an unusual experience and, on first accounting, any reader will possibly think that any one flying a "grasshopper" has to be crazy and not too anxious to remain on this green earth. The first few days of this kind of flying, I'll admit, are pretty alarming—particularly if you've spent most of your flying abiding by CAA regulations and flying cross country at nice comfortable altitudes.

Instructions were flown to Army truck convoys like this by "grasshoppers." The ships landed in roads like that in which trucks are, or in paths beside the supply column.

First off, as a "grasshopper" pilot, you've got to forget entirely all the rules of flying except the fundamental common sense rules of safety. You've got to forget about the consequences of engine failure, either cross country or on take-off. You've got to learn how to hedgehop like you never hedgehopped before, so that the enemy won't see you while you're sneaking in to scout their position. You've got to forget about taking off always into the wind because you never have anything better than a one direction "airport" and chances are pretty good that you'll have a cross wind. You've got to forget all about neat "pattern" approaches because you're seldom high enough to even wind back the stabilizer. You've got to learn how to bring them in on the "ragged" edge so

First of the popular lightplanes to go into standard Army service is this Taylorcraft YO-57. Note wind generator on strut to power ship's special radio equipment.

that she'll quit flying the minute you close the throttle entirely—you've got to hit the edge of the field or run out of airport.

You've got to learn just how much brake you can apply for maximum stopping in short spaces. You've got to learn how to raise the tail to flying position and then release the brakes just enough so you can always see over the nose and keep your wheels in the tire ruts so that you won't catch a wheel in the mesquite. You've got to learn how to take off in a semicircle around the side of a conical-shaped hill. You've got to get used to landing in fields and clearings which last year you wouldn't consider trying if it was zero zero and you were running out of gas. From a casual glance you can draw the conclusion that flying a "grasshopper" is not exactly a picnic.

However, while it might sound dangerous and the kind of flying which only a veteran should try, it really isn't as tough as it sounds. In fact it comes pretty easy after you're used to it. Most of the "grasshopper" pilots have private licenses with only a few hundred hours. They had had no special short field training, they were doing no more than any pilot with a hundred or so hours could do if given the chance. Most pilots don't ever fly like we had to, because there is no reason or need to when you're flying off regular airports all the time. Frankly, it amazed even the more experienced of us to see what these little ships could do when they were called to bounce out of a 400-foot field, full of ruts, roots and weeds. Given a chance these little airplanes will do a remarkable job of fancy flying.

The author, on special duty as Army lightplane pilot, points to "grasshopper" insignia on his "Cub." Ship later was camouflaged like that shown at the top of page 31.

All of this is the reason for the great possibilities which these airplanes present for Army use. They can be flown out of the smallest fields and can be flown by pilots with little or no special training. Now that we have suggested briefly what these airplanes did and are still doing (this is being written in an Army tent somewhere in Louisiana during the maneuvers) let us look at the place the lightplane has in military activity. Many lightplane advocates have for years been claiming that the small plane could be invaluable for carrying messages, liaison work, short reconnaisance, artillery fire direction, etc. Well, this summer the lightplanes were put through every one of these tests.

At Tennessee during the June maneuvers the small ships were used successfully for direction of artillery. Previously captive balloons were used, but they are extremely vulnerable and unwieldy. Ground observation is of little value as more times than not the target is not even visible from the firing point. During these maneuvers the light ships cruised slowly back and forth behind the batteries at 500 to 1,000 feet, radioing down corrections after each shot. Since the batteries are always located several miles behind the front lines the ships are in little danger of ground enemy fire and since they're so low they're equally immune from enemy air action. Commenting on the lightplane's usefulness in directing artillery fire, Lieut. Col. Ewing G. Wells of the Second Army said of the ships that they "can fly lower and slower than anything we've got, enabling the observer to see more; and its maneuverability allows the plane to land in almost any field near the troops its crew is directing."

At the El Paso maneuvers the planes were to be put to more extensive uses. With the development of mechanized warfare, various ground units are scattered all over the landscape and a regimental, divisional or corps commander finds it increasingly difficult to keep track of latest movements, not only of the enemy but his own units as well. Radio has been adopted extensively to help maintain these contacts with outlying units, but the need still exists for quick and readily available aerial observation and communication. Here is where the light ships did—and will—come in very handily. Because they can land almost anywhere, the ships can jump right along with division headquarters and be available in a minute's notice to go out on reconnaisance, drop messages to other units or even carry emergency provisions.

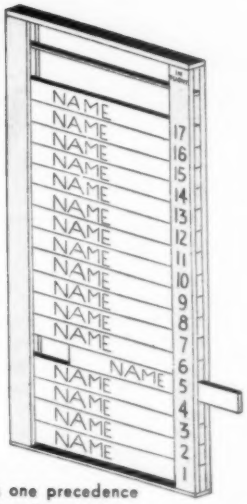
A perfect example of the rapidity with which the lightplanes can perform their missions came during one of the problems in the desert warfare. Gen. Innis P. Swift found it necessary to send some urgent messages and latest situation maps to an outlying regiment. At that moment no "grasshopper" was available on the spot, so he radioed Biggs Field, the Air Force's base at El Paso, to send out a ship. Twenty minutes later, a *Cub* landed next to the command post, picked up the message and was on its way.

(*Continued on page* 102)

# A Flight Precedence SYSTEM

## by RUSS ALEXANDER

*Here's a novel system for flying clubs that gives everyone his turn in the air. The inventor tells how to use it.*




Each ship has one precedence board with slats for members.

IS the question of "who flies when?" creating a perpetual undercurrent of ill-feeling among your flying club's members, thus laying the ground for ultimate disruption of the organization? Then here's a flight-dispatching system which solved the problem in my club once and for all. It will work as well in yours.

This precedence board plan was first put into effect by the Flying Forty, Long Beach, Cal., a group of 20, organized by the writer about a year ago. It provides an equitable allotment of air time for everyone at all times—including over week ends and holidays, when most flying is done. It was never realized just how effective the system was until, on changing base of operations, the board was temporarily abandoned. This resulted both in confusion and in considerable hostility between the members. Then the precedence board was returned to operation and now all is serene.

The board consists of a series of slats arranged vertically in a holder. All slats automatically fall to a position one slat lower when the bottom slat is removed. One of these slats is provided for each member and his name is lettered thereon. The holder is open at one edge to permit removal of any slat. One side is numbered from the bottom up, one, two, three, etc., to the total number of club members. At the top of the board is a fixed slot to contain a single slat. This slot is lettered "In Flight." The numbers at the side are called the "PB Numbers" and give the flying precedence number of the person whose name appears opposite. The bottom man has first precedence, the man next above second, and so on to the top man, who has least and must wait.

Wingtip Willie (a member in good standing) arrives at the field with his good friend Tailskid Tommy (also in good standing) and they both want to fly. A glance at the board shows that Wingtip's number is three, while Tailskid's name is in the No. 5 slot. There is no other club member present whose number is less than three, so Wingtip withdraws his slat from No. 3 position, puts it in the "In Flight" slot, cranks up the club's ship and heads for the troposphere. When he withdrew his slat, gravity automatically advanced all slats above his one number closer to the coveted No. 1 position. Tailskid is now No. 4 instead of No. 5 and when Wingtip returns, he may fly, *providing* no members having Nos. 1, 2, or 3 arrive before them. If they do come, however, they may justly fly before him because Tailskid has flown, as the board shows, *since* Nos. 1, 2, or 3 flew last. When Wingtip Willie returns, he removes his slat from the "In Flight" position, returns it to the top of the stack (giving him last position) and leaves Tailskid occupying the "In Flight" position.

Always, therefore, the board provides flying for the man who has flown *least*, giving him precedence over the man who flew last and therefore *most*, relatively speaking. No argument is possible.

Multiple ship operation of the board is much the same as for single. For each additional ship an individual "Reserved" and "In Flight" slot will be required, and these additional features may well be incorporated within the same board.

It works like this: with two or more ships to select from, a member arriving and having flight precedence as determinded by the board, may desire to await the return of a particular ship. He may then remove his slat from the board and insert it in the "Reserved" slot under the "In Flight" position for the ship desired. Upon the return of the ship reserved he may fly it by inserting his name slat in the proper position as soon as the "In Flight" slot is vacant.

It was felt that in the event of two or more ships being club-owned, a single reservation would have some advantages and no disadvantages. At no time could the ship be reserved for longer than one flight period, permitting the board to function with fairness to everyone. In the case of two pilots arriving simultaneously, the pilot having the lesser number may first select the ship he desires to fly, solving the problem of horsepower differences without horseplay.

From the operating experience of the Flying Forty, the following suggestions are offered:

1. The first placement of names on the board can be made best by drawing lots.
2. Club regulations should provide that each member—and no one else—handle his own name slat.
3. No telephone reservations allowed.
4. A slat titled "Grounded" may be provided for each ship in case it is not to be flown.
5. Delinquent members, or members

(*Continued on page* 104)

Last name on list is first to fly. Member removes name panel, others move up.

Member whose turn it is to fly, places name in top position marked "in flight."

When "eligible" members aren't present, next lowest can fly, following system.

# Does America Want A SEPARATE AIR FORCE?

## An Introduction

THIS is the most critical question in what may yet prove to be the most critical hour of our history: does America want a Separate Air Force?

Which is the road to efficient operation? . . . Which will serve to create that invincible defense force for which America now struggles against time? The destiny of the nation trembles in the balance as the decision is being weighed.

FLYING AND POPULAR AVIATION is honored to present the arguments carried forward by the most brilliant proponents of both sides of the question. Both they and we do so at this critical hour with the view of rendering an essential public service. We hope it will eliminate some of the confusion and clarify the issues.

Now we are up against stark reality. This is no cheap political matter, no subject for pork barrel politics. We are in a world struggle, the result of which will determine the course of history for all time to come. The foremost weapon in that struggle is the airplane. Whoever rules the air will rule the continents beneath it.

Along with others who have fought these years through for American air supremacy, I believed that the nation would be better served if it had a Separate Air Force, a striking arm additional to the Services employed by our admirable Navy and rapidly expanding Army. I have been influenced by many matters—by emotion perhaps—by what seemed to be inescapable fact, by my love for Billy Mitchell, the great American strategist of the air.

What a great and stirring figure he was, the man of prophecy and vision, coldly honest, but not political-minded. The passionate contentions which centered around his name have been gradually erased by time, but the fiction of contention remains. I am happy to say now that whatever stands in the way of General Mitchell's enshrinement as the great American prophet of aviation is to be removed. His great qualities as an outstanding military genius will be publicly recognized by his reinstatement in the rank of brigadier general, by recommendation to Congress by the War Department. This noble and well-justified gesture toward the memory of a great man will go far to palliate a sore whose roots have struck deep. It will be testimony not only to the greatness of Mitchell but to the stature of those who will make it.

What stand shall the American people take on the question of a Separate Air Force? Frankly, I do not know. We have a great Chief of Staff who asserts that any effort in this direction at this time would be disruptive or even disastrous to the defense effort. Let us recognize the factors for what they are. Since he has gone on record so strongly, a vote for a Separate Air Force will be a vote of non-confidence in his opinion and judgment. It will be a vote of non-confidence in the War Department; it will be a vote of non-confidence in the Secretary of the Navy who as strongly opposes the measure. If it passes Congress, as it now seems likely that it will, it will certainly be vetoed by the President. It may thus create disunity and, with it, resulting inefficiency at a time when the nation can least afford it—even if the proponents of the measure are correct.

On the other hand, the need for a separate air establishment may be so great as to make even so grave a risk as this necessary.

This is the issue which is now to be tried before the Senate.

May God grant the gentlemen wisdom!

William B. Ziff

Publisher

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**United States Senate**
COMMITTEE ON MILITARY AFFAIRS

September 12, 1941

Mr. William B. Ziff, Publisher
FLYING and POPULAR AVIATION
Chicago, Illinois

Dear Mr. Ziff:

The country at large is justifiedly concerned with the vital matters connected with the proposed hearings on the McCarran Bill S. 1635, which has as its objective the creation of a separate Air Force. As chairman of the Senate Military Affairs Committee I propose seeing that a fair public hearing be given both sides with reference to the important matters affected by this bill.

I have assured Senator McCarran that he will be provided with full hearings on his bill, and that I would secure the permission of my committee to begin these hearings when he was ready to proceed, which I understand will be October 15, 1941, or thereabouts. At this time I hope to provide all of those interested in this subject with the opportunity of being heard, since I believe that a full discussion of the issues involved, before the full Military Affairs Committee, will be of the greatest possible benefit. Certainly the public at large is deeply concerned with this proposal and has every right to be fully informed in a matter which may ultimately affect the well being and safety of the nation itself.

Personally, I also desire more information on this subject, and I shall follow the testimony and information developed at these hearings with eager and, I hope, impartial interest. I must say, however, that were I called upon for an opinion today I would have to admit that I favor the establishment of a separate Air Force, to be administered by a cabinet officer. I wish to take this opportunity of complimenting you upon the splendid service you are rendering our country through your influential publication.

Cordially yours,

Robert R. Reynolds

As chairman of the Military Affairs Committee of the Senate, Robert Rice Reynolds is one of the most important men in Washington from an aviation standpoint. The 57-year-old senator from North Carolina, one of the most air-minded in the Senate, is a native of Asheville, N. C., and a graduate of the University of North Carolina. The 20th ranking senator from point of service, Reynolds entered the Senate December 5, 1932; his present term expires in 1945. In addition to the Military Affairs Committee, Senator Reynolds is a member of the District of Columbia, Foreign Relations and Territories and Insular Affairs Committees.—Ed.

# My Views on Senate Bill 1635*

By Pat McCarran

Senator from Nevada, Author of the Bill

Born in Reno, Nev., Aug. 8, 1876, Sen. Patrick A. (Pat) McCarran (D.) attended public schools in Reno and later was graduated from the University of Nevada. He has been prominent in that state's judicial and legislative activities since 1903 when he was elected to serve as a member of the Nevada Legislature and represented the state at the irrigation congress.

Senator McCarran served as district attorney of Nye County, Nev., from 1906-08 and from 1913-16 and 1917-18 served respectively as associate justice and chief justice of the Nevada Supreme Court. From 1920-21 he was president of the Nevada State Bar Association. In 1922-23 he was vice-president of the American Bar Association.

In 1932 he was elected to the United States Senate and was re-elected to that office in 1938. He is serving at the present time on Senate Committees including, Appropriations, Judiciary, Post Offices and Post Roads, Public Lands and Surveys.

Senator McCarran is one of the best informed men in the Senate on aviation. He was co-author of the famed McCarran-Lea Bill dealing with airline legislation.—Ed.

"NO chain is stronger than its weakest link" is a time honored truism which has become quite commonplace in our day of mechanistic perfection. Yet it is alarming to note how many high-ranking officials in our Government and Military and Naval establishments are willing to permit a divided, disjointed air force in the United States at the very moment when they acknowledge she may be in the direst peril.

We are in a period of the gravest crisis when our military efficiency may spell the difference between the survival of this great and glorious nation and some disaster too awful to contemplate.

We may start by assuming that all of the opinions involved are dictated by a good American conscience. It would be a grave mistake to assume that mere vested interests or blind adherence to ties of a dead tradition would determine the opinions of those who support or oppose this essential measure. We may believe too that the strong feelings engendered in the unfortunate discrediting of Billy Mitchell have now given way to a more reasoned and generous view of the accomplishments of this greatest of aviation figures. That Mitchell was not a diplomat, no one will deny—just as no reasonable man can deny that he was also a genius and a prophet.

He angered the officials of his day by stating, and proving, that airplanes could sink unattended battleships. He went further than that, however, and intimated that eventually airplanes would supplant battleships. I have always thought that Mitchell himself did not believe this, but made the statement in desperation and in an effort to draw the opposition out. What Mitchell meant, no doubt, was that eventually battleships which did not have adequate air protection would be at the mercy of superior air power. This, I think, is generally conceded to be true.

My bill—S.1635, a bill to establish a Department of Aviation—is designed to accomplish what I think General Mitchell tried in vain to accomplish 16 years ago.

In order that there may be no misunderstanding with respect to the provisions of the bill I should like to quote from one pertinent section, as follows:

"The Air Force shall be so trained as to comprise a combatant force of the United States with a view to operating either with the armed land or sea forces of the United States, or with both combined, or independently of either, as the President may determine. The President is authorized to attach such units of the Air Force as may be necessary for cooperation with the armed land and sea forces of the United States in time of war or threatened hostilities, and during maneuvers, target practice, and such other exercises as may be held by those forces. When such units are so attached, they shall be under the command of the designated commander of the land or sea force, or both, as the case may be. Should the offensive or defensive operation in time of peace be from their nature aeronautical, the President is authorized to attach to the Air Force such units of the armed land or sea forces as he may deem necessary. When such units are so attached, they shall be under the command of the designated commander of the Air Force."

The foregoing, I believe, indicates that passage of this bill will not result in the Navy losing its magnificent air force, nor in the Army losing its excellent air force. Passage of the bill will, however, result in the building up of an Army Air Force and a Navy Air Force far surpassing the fondest hopes of the air officers in either branch of the service, and in addition it will create a reserve air force capable of furnishing practically inexhaustible reinforcements for either branch when necessary. The United States has four air forces: the Army, Navy, Marine and Coast Guard. Each has its own procurement offices, each has its own personnel offices, each is striving to secure priorities for its own air arm, each is contriving and perfecting secret weapons sometimes unknown to the other air forces, all resulting in a wasteful duplication of effort and overlapping of functions detrimental to efficiency and costly to the taxpayer. Passage of this bill will result in the consolidation of the research, engineering, procurement, training and other bureaus of the Air Corps and the Bureau of Aeronautics which now duplicate essential work.

Despite our ardent advocacy of this proposition, the result of long and careful study, we who hold for a separate air establishment are anxious for an honest and thorough hearing of the arguments on both sides of the question. We could do no less than this as patriotic representatives of the greatest free people on this earth, people who will defend their liberties and freedom at all costs. This is a critical situation and the question of superiority in heavier-than-air machines may be the determining factor. We do not question the motives or patriotism of those whose views on this subject do not coincide with our own, nor do we expect than to question ours.

The facts involved can only be established by a fair and equitable hearing in which the contentions of both sides are carefully considered. This we now propose to do.

* For full text, see page 51.—Ed.

# How the Senate would Vote Today on the Question of a Separate Air Establishment

Just as we went to press, Senator McCarran's office completed a special poll of the Senate on the vital subject of the Separate Air Service. This preliminary survey is of dramatic importance in that it shows exactly what quarter the wind is blowing from on this question. It indicates a definite trend *toward* acceptance of such a separate air arm. 49 out of the 96 senators answered the poll.

*To The Question:*

## Do You Favor a Separate Air Service?

| | |
|---|---|
| For a Separate Air Service | 18 |
| Against | 6 |
| Not sure | 16 |
| No opinion | 9 |

*Of the 16 who voted "not sure" 10 felt that they would probably favor a separate air service in the absence of any additional information, and 5 felt that they would be against it under the same conditions. One did not further qualify his vote.*

*To The Question:*

## Do You Favor a Secretary of Aviation?

| | |
|---|---|
| For a Secretary of Aviation | 18 |
| Against | 6 |
| Not sure | 16 |
| No opinion | 9 |

*Of the 16 who voted "not sure" 9 felt inclined to favor the appointment of a Secretary of Aviation, and 7 tended to be against it.*

It is obvious that though the *trend* is toward adoption of a Separate Air Service, those *unqualifiedly for* such an establishment are yet decidedly in the minority. The combined plurality of those against, not sure, or of no opinion is still overwhelming if they can be won over by the witnesses to be placed on the stand by those in favor of retaining the present system. It is evident from the poll, however, that their job will be no easy one.

It is interesting to compare this poll with that conducted by Congressman Frank Osmers of New Jersey in the House of Representatives. Here a startling divergence of view from that of the upper house is indicated.

All told 125 members of the House replied out of a total of 435 polled. The queries and vote were as follows:

## Do You Favor a Separate and Unified Air Force?

| | |
|---|---|
| For | 82 |
| Against | 27 |
| No opinion | 16 |

## If So, Do You Think It Should Be Administered by:

| | |
|---|---|
| A. A Secretary for Air? | 40 |
| B. Secretary for National Defense with under-secretaries for War, Navy, and Air | 31 |
| C. No opinion | 11 |

A portion of Congressman Osmers' poll was made public on August 8. At that time, the figures were 66 for a Separate Air Service; 24 against; and 10, no opinion.

This latest information would tend to show that while the poll of the lower house may be less reliable than that of the Senate, since it represents a smaller fraction of the membership, additional polling indicates that sentiment in that body on this vital issue remains more or less constant.

From the figures it would appear that the opponents of the Separate Air Establishment measure will have to beat it in the Senate if at all.

# The Case For a Separate Air Force

By Harold E. Hartney

A competent attorney as well as a veteran airman, Lieut. Col. Harold Evans Hartney (Air Force Reserve) started his flying career in 1915 with Britain's Royal Flying Corps. He transferred to the American Air Service in 1917, continuing a distinguished career in military aviation as commanding officer of our First Pursuit Group on the front in World War I. Among other decorations he holds the D.S.C., the Silver Star, Purple Heart, French Legion of Honor, Croix de Guerre (three palms), Italian Silver Medal for Valor and the British War Medal. Since resigning from the Army in 1921, Lieutenant Colonel Hartney has served as technical adviser for many aeronautical concerns, has done a great deal of aviation work in Washington where he now lives.—Ed.

THE present war has taught the world many lessons. Possibly the most important has been that coordination of the three arms of defense is vital. Unless we have a separate air arm, aviation will not have its General Marshall, its Admiral Stark. In other words the Commander-in-Chief, in selecting his commander for any campaign in any zone of action, when he comes to the point of naming a man for the job will in all probability have to rely for the selection upon the recommendation of an old service—the Army—or a younger service, the Navy. One can be sure it will either be an Army man or a Navy man and he can almost equally be certain that aviation will continue to be where it now is—subservient in that campaign to an Army or a Navy man even though the primary, possibly sole, function of that campaign in that particular zone is air warfare. To insure coordination of all arms is probably one of the greatest arguments for forming separate air force in which the ambitious young cadet, when he starts to fly, may harbor dreams of some day being top man—not in the Army, not in the Navy, but in the flying forces of the independent air arm. Support or service aviation in the Army and Navy will always be operated by more or less junior flying officers of those two arms wearing the uniform and actually part of those older services taking their orders from their respective superiors.

Within our Navy aviation affairs are pretty well in hand. As Rear Admiral Cook, when he was chief of the Bureau of Aeronautics speaking before the Aviation Forum in Washington, February 20, 1939, stated, and as all Naval officers now agree:

"Broadly speaking (aircraft of the Navy) have but one function; to assist the Fleet in achieving victory at sea. . . . Of all the elements which make for the success of a Naval campaign the most important is the service of information. . . . While the primary duty is scouting, they carry offensive and defensive armament of considerable power . . . for it is by the cumulative effect or damage that a man-of-war is forced to leave the line, to fall prey to the destroyer and the submarine. Those briefly are the battle functions of Naval aircraft."

In the War Department, the gallant and highly efficient officers struggle to compose their support (Army aviation) with a striking new three-dimensional fighting force and this is absolutely impossible of accomplishment. Let us suppose that of all British aviation, half today were with the Royal Navy and half with the Army and that there was no Royal Air Force. Would Churchill turn all over to the Army or all to the Navy or would he leave it "as is" with divided command and responsibility while the grand fleet keeps in hiding? He would not. He would be forced to take his flying machines and personnel and concentrate them where most needed. He would have to form an independent Air Force right now. True, all he would get would be the tactical and strategical benefits—no production or development benefits whatsoever—but for that alone he would be justified so as to insure perfect coordination, the secret weapon of modern warfare.

OUR country must have a separate striking air force. To explain how it can and why it should come into being without disruption is the purpose of this article.

A Congressional emergency declaration rider tacked on to any routine bill can create and implement such a body. It is my proposal that immediate mandatory rider provisions, detailed here, should call for a special coordinator or assistant to our commander-in-chief, the President. This coordinator will decide which command—Army, Navy, or Air Force—is to direct any given campaign. In addition to him, two new Governmental departments headed by cabinet officers—a Secretary for Air and a Secretary for Aircraft Production—will be established.

A new air defense organization, the Independent Air Arm—a mobile striking force instantly available for defensive or offensive operations—will be set up immediately under the Department of Air. Its authorized strength is to be 1,000,000 officers and enlisted men, with recruiting to half strength to begin at once. All personnel above sergeants in this first quota must have at least 50 hours' solo flight. Organized on lines duplicating the U. S. Army's, Independent Air Arm personnel will have their own titles, uniforms, budget, promotion list, property, way of life, services and traditions.

Provision for personnel, establishment and administration (including training) of this new defense arm shall be for the present in the hands of a board composed of the Assistant Secretary of War for Air, the Deputy Chief of Staff and the U. S. Air Force staff. Ex officio, the Assistant Secretary of the Navy for Air, and the Assistant Secretary of Commerce for Aviation will be members. Personnel assisting the board

are to be detailed from and paid by the Government agency to which now attached. The Assistant Secretary also may transfer up to 50 per cent of present War Department aviation funds, personnel and property to Department of Air (or its pre-organization nucleus) control. On or before December 1, 1941, he will begin organizing the Independent Air Arm and submit a plan and enabling legislation for solidifying this emergency provision, together with enabling legislation.

The board may employ necessary clerical help, together with 450 experts, 75 per cent of whom must be retired Reserve, National Guard, or specialist reserve aviation officers. Fifty may be retained for not to exceed one year at salaries of $10,000 per year, 150 at $5,000 a year and 250 at $3,800, without regard to Civil Service rules; provided, however, that they have in an aggregate been in aviation continuously for at least a year.

Twenty-five million dollars of Lend-Lease funds for carrying out this legislation shall be placed to the credit and disposition of the board by the President forthwith.

The Civil Aeronautics Administration ultimately will be transferred to the Department of Air. In the interim, the CAA should be kept intact, with the Administrator acting also as one of the Department's undersecretaries. He will help the Secretary for Air to coordinate and control all U. S. air. The CAA's transfer from the Department of Commerce —together with the Weather Bureau and other agencies— will depend entirely on the present emergency's development. The Civil Aeronautics Board will remain as part of the Department of Commerce. Anti-aircraft artillery must be made part of the Independent Striking Force.

Naval aviation, including Marine and Coast Guard, are to remain as at present, save that all procurement, applied research, experimentation and developmental work shall be pooled in the Department of Aircraft Production, although the Navy will continue responsible for all its new prototype aircraft required, as well as all service testing. A two-ocean Navy with at least 20 additional medium-sized aircraft carriers and 2,500 additional four-engined land and boat-type planes, and 20 dirigibles big enough to carry aircraft, must be authorized and rushed to completion. (Germany built over 100 rigid airships in World War I.)

War Department aviation also will remain the same for the time being, but ultimately striking air units will be absorbed into the Independent Air Arm, leaving nothing but service aviation for the Army.

The Department of Aircraft Production will direct all procurement and quantity production of aircraft, accessories or appliances for the U. S. Government or for countries covered by the Lend-Lease Act.

"But," comes the inevitable question, "why take such drastic steps? Are they really necessary?"

On November 11, 1918, Germany lay prostrate, a vanquished nation, forbidden by the Versailles Treaty to build sizeable aircraft. Her aviation was stripped from her. She was bankrupt. The same day saw the United States a victor, possessor of unlimited wealth, the world's most fertile field for aviation development.

From 1918 to 1933 Germany busied herself with small planes, gliders and limited-performance civil aviation. In the United States during this period more than 20 Governmental aviation agencies were formed as aeronautics matured here. All were relatively insignificant appropriation panhandlers. To this day none is represented in the cabinet, save by two assistant secretaries.

Then, on May 15, 1933, Germany authorized creation of an air secretary. All aviation was centralized in one department under Hermann Goering and the *Luftwaffe* established. Monstrous schedules of production, training and maneuvers were set. The Spanish and Chinese wars were exploited as proving grounds. U. S. aviation, meantime, continued to drift except in the airline operations field. But little heed was paid here to wars abroad.

From September 1, 1939, up to the present, Germany has reaped the dividends of centralized control of aviation with successful invasion of country after country. Air Marshal Goering has directed all Germany military strategy. World War Ace Ernst Udet is in charge of production. Another ace, Rudolph Hess, was second assistant to Hitler himself. Today the triumphant *Luftwaffe*—consisting of a striking air force, plus army and navy air services—flies on.

Our own nation, in turn, began showing signs of awakening. By May 15, 1940, President Roosevelt, in view of the European situation, called for and got big aircraft appropriations. Progress continues slow and discouraging, however; we still have no cabinet officer for the air. Our only striking force is the Army's Combat Command, successor to the GHQ Air Force.

From the tactical angle the *Luftwaffe* is trained and war-proven. It has destroyed 4,200 British and French planes and 6,700 Russian planes and has helped to destroy 5,500,000 tons of shipping. The United States, by way of contrast, has no more than 1,000 armed aircraft ready to fight, with only several hundred modern, in the present war's terms. Our personnel is unskilled in war. We still lack any real independent air command and all efforts to develop new tactics and strategy are crushed promptly. Thus, we developed and forgot about parachute troops (1921), multi-gunned fire volume (1921), night photography (1925-30), new-type bombs (1923), maneuvers against battleships (1921) and many others. Even when started, both appropriations and programs are smothered because airmen have no cabinet voice.

Strategically speaking, the *Luftwaffe* consists of an aircraft industry employing 25,000 pilots of all types, 40,000 observers and other ground officers and 500,000 enlisted men operating 14,000 front line aircraft of all kinds, while 25,000 more ships remain in reserve. In addition, a naval air service has 2,500 naval aircraft of all kinds in front line service, backed by 3,800 in reserve. Naval pilots number 2,800; other officer personnel, 5,000; enlisted men, 50,000. The army air service consists of 1,500 planes (observation, etc.), plus another 3,000 reserves; 2,000 officer pilots, 3,500 other officer personnel and 50,000 enlisted men. Supplementing all these are 10,000 trained parachute troops, 50,000 trained glider and air-borne infantrymen, 4,000 gliders and 10,000 glider-operating enlisted personnel with more coming up every day.

What can the United States offer in the face of this force? Nothing but a small Combat Command under the Army and 500 airplanes (mostly on paper), plus an undetermined number on order. Our aircraft industry employs only 350,000 men, despite the fact that thousands of skilled mechanics and machine tools outside the industry remain idle. Naval aircraft number 4,222, with 6,054 on order. Our total pilot supply is inadequate and we have no reserve. Even our paper objective is only 40,000 planes in 253 squadrons or 54 groups. We have 1,000 parachute troops, but harmonious relations between them and the Air Forces are lacking. We have no transport gliders nor any air infantry as such.

The contrast as to comparative condition is equally bad. The *Luftwaffe*, after seven years' training up to September 1, 1939, has had 50 per cent of its personnel in action. The balance are thoroughly trained. Casualties have been replaced completely. Equipment replacements have been increased by the industry until today it is 20 per cent better off than on September 1, 1939. Two thousand planes per month are being produced. All are built for actual field service conditions. At least five new fighter and four new bomber types are ready to go into production. Engines of 2,000 h.p., all tests (including field) passed, are ready for 1,500-per-month production, as of September 1, 1941.

Here, warplane production, exclusive of trainers (including those for Great Britain), is 850 per month. We have two promising new bomber prototypes. Also three other types, one year away from production. Two thousand h.p. air-

cooled engines are going into production rapidly, however. We are banking on some new plants and some production schedules of enormous benefit—provided they work out. The stakes are exceeded only by the gamble.

As to organization: The *Luftwaffe*, composed of all the units mentioned above, is commanded by the second highest-ranking man in Germany, his power exceeded only by Hitler's. Airmen may be in supreme command in any invasion or campaign. Technical development units for radio, fuels, airplane structure and ordnance are all within the *Luftwaffe* and entirely separate from the army and navy. Air force personnel wear their own uniforms and have their own seniority, ranks, grade, membership and retirement privileges, also apart from the army and navy. All airports are under *Luftwaffe* control, whether in Germany or in occupied countries.

American aviation has one Assistant Secretary for Air in the War Department, one in the Navy Department and another in the Department of Commerce, but no actual cabinet officers. All aviation is concentrated in the Naval air service and the Army Air Forces. In civilian aviation we have unsurpassed overseas and South American commercial airlines as well as good domestic air service (350 civil transports). Several Governmental agencies control aviation activities; one "top-man" in each reminds one of that *legendary* army, all generals, no privates. Both Army and Navy set up individual aircraft specifications and inspection services, though there is a semblance of coordination through the Aeronautical Board. Airports are under divided — and sometimes overlapping — control.

The *Luftwaffe* also controls all radio networks. Specifications for aviation fuels and lubricants all are under one control, as are those for accessories, instruments and hardware. Its inspection service and service of supply are wholly self-contained. There is factory inspection for production, with one standard system for everything pertaining to aircraft equipment and supplies. I hope this observation will not fall on deaf ears.

All *Luftwaffe* primary training is pooled and centralized, whether for officers, enlisted men, parachute troops, air infantry, ground forces or flying personnel. Second-stage training and finishing schools are controlled by a centralized agency. Formal instruction completed, personnel is detailed to army and navy units for duty. In the United States the CAA, Army and Navy all have their own training programs. No actual coordination exists save from CAA to Army in the CPTP primary course; this does not extend to second-stage training.

Our training rate is 2,500 service pilots per month (at present it is 1,000). Germany has now trained replacement personnel available at a rate of 10 per cent per month for all classes. Two thousand service pilots and 15,000 primary trainees—including glider pilots—are produced each month. Nazi personnel, ammunition and supply reserves are 100 per cent complete. Antiaircraft equipment, entirely *Luftwaffe*-controlled, includes 4,000 guns over four inches, 25,000 under four inches, 25,000 37 mm. class and 50,000 .50 caliber. We have no reserves in service by units other than those included above. Our antiaircraft artillery (under another branch of the Army) is limited to 50 guns over four inches (these are unproven in the field); 100 under four inches; and 3,500 .50 caliber machine guns. (Production on the latter is coming on rapidly, however.)

The Nazis' anti-gas service is highly organized; everyone has a gas mask. We have insufficient of these. Their air raid warning service has proved most efficient. Ours is just getting under way. Its organizers are discouraged because local communities are apathetic. They have 3,000 barrage and observation balloons, as against our 100.

Ten thousand bombs of 2,000 pounds or more are on hand for *Luftwaffe* use. We have 100. German replacement rate on these is 300 per day. They also have 20,000 1,100-pound bombs, with 250 replaced daily. Other bombs (replaceable at the rate of 5,000 per day) including incendiaries, total 100,000. We have 3,000 of the 1,100-pound bombs. Our replacement rate on bombs of all kinds aggregates 500 per day.

In the vital matter of warplanes, the Nazis have 500 capable of operating at 35,000 feet with full war load. We have 10. Their fighter planes capable of 360 m.p.h. under full war load at 15,000 feet number 6,000; ours, 100. They boast 8,000 bombers which can carry one-ton bombs 3,000 miles at 200 m.p.h. or better. We, 275. On aircraft-carrying surface vessels, however, we outnumber them, seven to none. The same holds true for airplanes mounted on warships.

"Granting all this," says the average citizen, "admitting that the *Luftwaffe* is vastly superior to what we can offer at present, isn't it true that we're rapidly catching up through our expansion program? Besides, what real proof do we have that American aviation's real need is cabinet representation and a separate air force?"

First let us consider the argument that our present expansion program will solve our problem. Assuming that Army and Navy air services will develop alike, estimates indicate that by June 1, 1943, U. S. Aircraft, in quantity, will equal Germany's. A high-ranking Air Forces' flying officer, speaking at Boston May 23, 1941, said: "By the end of next month, the Air Forces expect to have 10,000 officers, more than 15,000 flying cadets and in excess of 150,000 enlisted men. By mid-year the Air Forces' training capacity is expected to be about 12,000 pilots yearly and 53,000 technicians. Plans are already under way for raising the pilot training rate to 30,000 a year and 100,000 technicians."

Yet will this be sufficient? Obviously not. We shall need at least 150,000 pilots of all kinds for the proposed Independent Air Force, the Army and the Navy. To obtain these we must examine 600,000 (willing) young men between ages of 20 and 26, and 275,000 must start pilot training in our schools. They will be divided between the Air Force 135,000, Army 7,500 and Navy 7,500.

In addition to pilots, the following supplementary personnel will be necessary: observers, bombardiers, gunners, navigators, 250,000; enlisted men, Air Force, Army and Navy, 850,000 (Air Force, 550,000; Army, 150,000; Navy, 150,000); aviation industry employees, excluding Government payroll, 4,000,000; air-borne infantry, 500,000; parachute troops, 100,000.

Aircraft must include 30,000 fighter planes, 6,500 heavy bombers, 30,000 medium and light bombers, 2,500 transport planes and 7,500 land and water towing gliders.

Now as to the second question: Are lack of cabinet representation and a separate air force American military aviation's real weakness? We can answer this question with another: What has been the deciding factor in the *Luftwaffe's* rise?

The Germans, because they had centralized authority working under experienced heads, developed many improvements unachievable under our own system. "Jeep"-carrying planes, parachute troops, glider-borne infantry and many other new concepts were evolved. *Yet each of the ideas mentioned here was tried out in the United States, then dropped as impracticable the moment it had outworn its publicity value!* It took foreign armies' success to revive them.

Many promising aviation fields lie fallow which would, if proven up, not only win this war but actually make practicable a subsequent world federation plan based on an international police force with such a concentrated air power that civilization could be stabilized and the world's population allowed to work out higher living standards. They will all lie dormant unless aviation is permitted to mature—encouraged not stifled.

Present impediments to U. S. air progress, listed in order of importance, include the following:

ORGANIZATION:

1. Aviation authority is not centralized in any cabinet officer reporting to the President. Too many uncoordinated Governmental agencies are working on their own.

2. We have no independent air arm with a separate roster,

uniform, traditions, etc., for its personnel.

3. The "air mentality" is not recognized as being on a par with the traditions and tactics of land and sea forces. The "air mind" is a wholly distinctive one. Aviation knowledge and experience are indispensible to its leadership wherever a campaign's basic factor is air attack. This could be the case were we to use Britain as an advance base for an aerial attack on Germany without the necessity of an accompanying AEF.

PRODUCTION:

4. In procurement, technique dominates operations. *This should be reversed,* so that service squadrons in the field dictate aircraft specifications from their own first-hand experience at home and in the present war zone. Army and Navy aircraft designs now originate largely in each service's engineering divisions. This is a dangerous, costly practice. The manufacturer, instead of working with the service units, works with the technicians. This is just as incongruous as it would be for the automobile manufacturer to build cars without consideration to the man behind the wheel.

Thus, in 1933-34, a general line of airplanes stemming from the Boeing "247" and the Douglas DC-2 appeared in world aviation. Those ships, which changed flying from contact to instrument, were not Army or Navy products. The airlines, where operations dominated technique, instigated them. Other vital technical advancements brought into being by civil aviation include reduction gears for motors, constant-speed propellers, de-icing equipment, aids to terrestrial navigation, hydraulic gear applications, radio navigation. Nothing kills pilot morale more quickly than inferior or obsolescent ships. Such equipment must be eliminated by subordinating technique to operations.

5. Aircraft engine production costs are too great—$14 a pound in engines of 1,000 h.p. and up, as compared to 18 cents a pound in the automobile industry. U. S. prices do not drop with quantity production, nor are the number of man-hours-per-unit cut. Airframe accessories and appliances, costs also are high—$13 per pound, as compared to 15 cents per pound for automobile chassis, instruments, accessories and appliances. To date this cost actually has gone up with quantity, while in England and Germany it reduced with quantity. Estimated prices there are $10 a pound for both motors and airframes. Our manufacturers continue to lose money—something wrong!

6. Small machine shops and skilled labor are left idle under our contract system, thus stifling initiative.

7. We have too few primary contractors and sub-contractors.

8. Our unstandardized and often inefficient system retards and lowers production.

9. Too many changes are made. Sometimes this results from the technicians who lay down the initial contract specifications not knowing their business. In German factories there are no changes once the prototype is approved.

10. The letting of sub-contracts and selection of sub-contractors has been handled in a hit-or-miss fashion not conducive to efficient production.

11. Existing facilities have not been utilized before building plants.

12. Private, not public, interests have been served in selecting plant expansion sites.

13. Manufacturers have been given no incentive to reduce production costs.

14. No one has been given any incentive for improving aircraft performance, simplifying design, or standardizing production technique.

15. No clear line of demarcation has been drawn between fundamental research, experimentation and development, service testing and production. Development, experimentation and service testing—responsibility not being fixed definitely in any one Government agency—is neglected dangerously.

16. There are too many strikes in basic industries contributing to aircraft production. Airplanes draw on approximately 78 different outside industries. A strike anywhere is felt.

TRAINING:

17. Primary training schools and practices are not consolidated.

18. Letting training contracts to a few select schools, as at present, is the lazy man's method and is inefficient and costly. All existing flying fields whether in the North or in the South and personnel must be utilized and the whole tied in properly with normal civil industry.

19. Largely due to the plane shortage, Combat Command service unit training is wholly inadequate.

20. Mechanic training, good so far as it goes, is wholly inadequate. Young men—including draftees—should be drawn from throughout the country.

LACK OF ECONOMY OF FORCES:

21. Design improvement is essential. Anthony Fokker's D-7 fighter plane, which cut its class' man-hour production costs 50 per cent was a great World War I advance for Germany. Procurement branches always must be careful to economize, even though monetary figures mean little in wartime. Skilled-man-hours, main cost item, are worth far more than money in today's emergency. Design, scarceness of materials and other factors thus lead to incongruous situations. For example, a bomber's propeller with its gear costs as much as two Cadillac cars!

22. We have too many—50—types of planes now produced for all defense and civil uses. This could be cut in half.

23. Due to insufficient service testing, insufficient care is used in evaluating prototype models. Utmost care must be given to such factors.

24. Insufficient liaison is conducted between British forces and our attaches and factory representatives. We should be using the present fight abroad as a proving ground.

With all these impediments barring our way and with the danger that lurks in over-standardization and carrying mass production too far, authority obviously must be given to some one hand.

The challenge to correct this situation strikes squarely at several groups within our national life. First it hits Congress, for Congress cannot hold the administration, the chief executive, or any cabinet member responsible should this country be defeated through its air forces' lamentable condition.

Second, it defies the Army and Navy air services, NACA, CAB, CAA and all Governmental agencies concerned with aeronautics, for these are the experts to whom Congressional committees will look for guidance.

Third, it challenges aviation's personnel, many of whom are shortsighted or selfish. A competent, centralized control of cabinet rank is worth as much to them as to the nation.

Hitler was counting on our inability to meet these challenges when he stated that the Lend-Lease Bill had come too late. He was confident he could destroy any aircraft we might ship to England but, more important, he felt sure that strikes, confusion, vacillation, hesitancy, fear and lethargy would sabotage our efforts. He knew about American aviation circles; confusion, resulting from a multiplicity and confusion of agencies; about our lack of aviation experience; our agencies' domination by designers and manufacturers and not by experienced flying specialists; the poor and sometimes prejudiced advice our conflicting agencies' members give Congressional committees; our Army's and Navy's preoccupation with Army and Navy work, with consequent aviation subserviency and dependence on principles strategically and tactically outmoded; the probabilities of our repeating World War I's aviation shortcomings; many of our responsible people's fear of having to tell the whole truth about aviation; and our false sense of security in the Atlantic Ocean as a "Maginot Line."

This last point is especially important. It helps Hitler by hiding from Americans modern aviation warfare's horrors. This acts as an opiate. We remain inactive and dominated by a "business-as-usual" psychology.

Hitler also counts on the time element. He is confident nothing can jolt our few aviation experts into sensibility until it is too late.

Meantime, statements by Britian's Churchill and others abroad indicate startling new air war potentials. They have discovered that in air power lies the democracies' only hope of defeating the Axis without at least 10 years' struggle. Hitler's tactics of striking at the opponent's heart—his base—must be adopted. This, only aviation can accomplish, for Germany has enslaved so many adjacent countries that only air power can reach German soil. This requires an Allied aircraft "jumping-off-point" within 500 miles of Berlin (the British Isles fill this purpose) and overwhelming superiority in planes (both bombers and fighters) and pilots. Hitler has gone so far that the last war's blockade cannot alone win the victory. Invasion of Europe is well nigh impossible and a world stalemate will result unless the democracies can, with extra heavy bombs, so harass Germany proper that she will forsake leaders and conquests alike and set up a government with which the Allies can deal.

Aviation already, after 24 months of war, has achieved equality with the Army and the Navy, becoming America's first line of offense and defense in the present world conflict. This war's major engagements have proved air supremacy to be a prerequisite to other arms' success. Germany's small four-battleship navy's effectiveness against England's sea mastery and merchant marine was due largely to air power. It made complete sea blockades a thing of the past. Germany has taken a toll of 5,500,000 shipping tons, all—even submarine and raider successes—predicated on *Luftwaffe* work.

Land and sea forces have reached a relative saturation point or stability. They can be figured; the element of surprise and newness—so vital to successful war—is largely wanting. Their mechanised arms—tanks and battleships—have achieved close to their developmental peak, since the former cannot go over 100 tons, the latter over 75,000. On the other hand, airplanes—in quantity, size, speed, radius of action and ceiling—may yet soar to almost fantastic comparative proportions. A single technical advance, such as rocket principle development, may change the entire picture.

In July, 1917, daylight bombing's horror forced England in the midst of war to centralize aviation activities and form the RAF, but there is no comparable shakeup in sight here. Without the RAF, the swastika would have been raised over Buckingham Palace last autumn. There would have been no eight-gun *Spitfires*, no RAF morale, no flying officers to make fundamental decisions without referring to remote higher-ups. But for these factors 180 German planes would not have been shot down over England, September 15, 1940. Goering's assurances to Hitler that Germany could invade and conquer England before that nation could prepare proved false.

These and many considerations which I shall outline elsewhere at the proper time show the need for a separate air arm as unquestionable. Effective technique and morale cannot come from a hodge-podge such as ours. Efficiency is the product of technical progress, quasi-mass production of equipment and a mighty fighting air force. Essential high *esprit de corps* can be engendered only in an independent air arm, separated from and in addition to Army and Navy "services."

Our country, by the Lend-Lease Act, is committed to fight for freedom and civilization as opposed to barbarism. Should England's fiber prove as unstable as that of France (unthinkable as this may be), the United States within a year will have to fight the world alone.

We have a superb one-ocean (we need two) Navy but, in this war's terms, no air force. We have an Army still insufficiently equipped. We are today as was Great Britain on September 1, 1939, but we have no backlog, as had England then in us, to fall back on. We do have two oceans flanking us but, by this time, even the worst isolationist is getting wise to that "fool's paradise."

Of all defense's confused elements aviation is worst, for it has literally cropped a kind of spontaneous combustion in many Government agencies; none, with the NACA's exception, report directly to the White House. All panhandle for appropriations through higher-ups who themselves are pressed for sufficient funds. Aviation has no rank. In all agencies save Army and Navy—where it is but a more or less autonomous service—it has been treated as a political football, with all the usual and costly short-comings resultant. If these were measured in terms of dollars only that would not matter much but life-blood will be the price we pay.

Our manufacturing industry has indigestion. It is being forced to swallow under pressure a $4,000,000,000 backlog in 12 months with a mouth and stomach whose proven capacity was only $1,000,000,000 in *20 years*.

In all our aviation purchases, the public sitting opposite industry, is represented by about 15 Federal agencies. Believe it or not the industry (the seller) often advises these. Thus the essential contractor-contractee relationship between the two has broken down completely to the embarrassment—not of the treasury (who in wartime worries about that!)—but of safe aircraft which your boy and mine must fly.

Office experts, not flying experts, dominate design, supply, performance, purchase, operation and everything else. Often our leaders do not realize or waken up to the fact that this fatal anomoly exists or, if they do, they cannot act before they get a new assignment. Very few qualified aeronautical experts are unaffected by an encumbering affiliation with some existing bureau or condition. Furthermore, it is almost impossible to retain an aviation expert outside the services because of the subject's complicated nature. Most authorities have concentrated on one phase only and are wholly ignorant of the coordinated picture as it applies to national security in peacetime as well as in emergency. I believe General H. H. Arnold's great difficulty in accomplishing what, after long years of experience, he knows must be done, has sprung as much from one-phase experts as any other existing factor.

The disunity and confusion of groping without leadership—without, in a word, a cabinet officer to direct, develop, operate and fight for this third element of our great war machine—must inevitably bring death to untold numbers of our people, eventual economic paralysis and, if not reversion to barbarism, at least crippling of our trade and lowering of our living standards of the misery level for millions. In Berlin in May, 1923, I paid 480,000 German marks for one glass of beer; I, for one, do not want to pay $120,000 here for a stein after this is over.

When 30 Gothas raided London by day in July, 1917, England was jarred out of its lethargy. A centralized air ministry was set up at once and a secretary for air appointed. We need the same kind of rude awakening. It might have been good fortune if, on May 10, 1941, Nazi bombers had flown over New York instead of London, destroying St. Johns Cathedral, Radio City and Wall Street and killing hundreds of noncombatants. Some shock surely must come along to arouse America to the need of aviation organization, led by men with flying knowledge and long flying experience.

This jolt, however, will not come from within. Neither will it come from without. Hitler could, with aviation, right now make two or three thrusts which would make this country fairly squirm. He could do it without loss of life to himself and get away "Scot free." But he won't, for Hitler never hits man or nation until he thinks he is in a position to completely destroy.

Our picture must be rectified by popular action. Polls of the people and of the House of Representatives show the majority in favor of *immediate* action. No theories count longer in the face of the part aviation played in the Battle of Britain, the Battle of the Atlantic, Crete and in each and every *blitzkrieg*.

The issue now is simply one of organization, of modernization, of efficiency. No longer is it political or partisan.

# Our Air Force is Autonomous

by Representative

Dow W. Harter

Congressman from Ohio

Congressman Dow Watters Harter (D.) has been representative from the 14th District of Ohio in the Congress of the United States since 1932. Since that time he has been a member of the House Military Affairs Committee and Sub-Committee on Aviation, assuming chairmanship of this latter committee in 1936.

Representative Harter was born in Akron, Ohio, January 2, 1885, and is a graduate of the University of Michigan Law School.

He has been intimately acquainted with the War Department through his service as a member of the House Military Affairs Committee and its Sub-Committee on Aviation for almost ten years. He now is likewise chairman of the current special committee investigating the present status and progress of military aviation. It may be said that, on the subject of a separate air force, Mr. Harter represents the views of the War Department.

Congressman Harter has flown over 100,000 miles in recent years, studying the existing situation in military aviation. There is hardly an important air base, air training establishment or aircraft factory in the United States or its possessions which he has not made himself acquainted with by personal observation. He has just completed an intensive survey of our air installations in the Caribbean area.—Ed.

THIS nation is facing dangerous days. We are facing the possibility of war. Consequently, I feel very keenly about the present agitation for a separate air force. It is a matter which has concerned me for several years. I have thought about it and studied it a great deal. As a member of the House Military Affairs Committee I am, of course, concerned with everything pertaining to national defense. I have had a particular interest, however, in military aviation, not only because I am interested in air matters in general, but because I am a firm believer in the importance of air power in its relation to national defense.

During the past few years I have been spending a great deal of time investigating aircraft production and the organization and training of our Army Air Corps and in endeavoring to learn just how we can go about improving its effectiveness.

I have felt that I should acquaint myself with the situation by personal observation and there is hardly an aircraft factory, an air base or air training establishment in the continental United States or its possessions that I have not visited during the past two or three years. I believe that I know what is going on in our Air Corps and in our Army, and also what progress is being made in our aircraft industry. I want to make sure that we have the best air force in the world.

PROPONENTS of a separate air force must predicate their arguments upon the assumption that the resulting organization would strengthen and make more effective the *armed forces* of the United States.

I have italicised "armed forces" for a very definite reason. Leaders in the aviation industry and the personnel of our Air Forces have a justified enthusiasm regarding the civil and military future of aviation, an enthusiasm which will surely develop this nation into the world's greatest air power. It is a salutary enthusiasm. All of us share it and anticipate the inevitable, tremendous strides of this mechanical prodigy which has revolutionized warfare and changed the way of life of mankind.

But the United States is engaged in a defense effort of unparalleled magnitude. The world is in flames. The President has declared an unlimited national emergency. Congress has made available billions of dollars in order to create as quickly as possible an impregnable military organization surpassing in effectiveness that of any other nation or combination of nations which may be thrown against us. Your military leaders therefore must focus their attention upon an effective *armed force,* having regard to the defense of this hemisphere and what type of force might be needed.

The Air Force is an extremely vital portion of a defense effort; its growing importance is fully attested by the results of recent campaigns in Europe. But it must not be considered apart from the whole picture of national defense. Our goal is to construct the best military force, not merely the best air force, in the world. This thought must be kept in mind if we are to have a proper perspective in considering a separate air force. Let it be understood we cannot construct the best defense force by neglecting the air arm.

Modern warfare has been radically transformed during recent years. This transformation has come suddenly. It represents almost a complete break with tactics and strategy of 1914-1918. The change has found many nations unprepared, primarily because their modes of thought and national aims have been directed toward peaceful pursuits with a consequent lack of emphasis upon military innovations. This was in most striking contrast to the feverish military preparation in which Germany had been engaged under the Hitler regime, a preparation which entailed all the concentrated efforts of far-seeing military command and their government, working day and night, year in and year out, with one objective—the building of the supremely effective German military machine.

As Nazi legions tramped with ridiculous ease through country after country, their pattern of combat followed almost identical lines. Irrespective of the type of resistance offered, certain fundamentals of Nazi warfare seemed to be irresistible. The three most important fundamentals of this new warfare, as bearing on the separate air force problem, were, first: that air power is imperative for modern warfare; second: that air superiority over critical combat areas is vital for military success and, third: that unity of command is mandatory for any military effort.

Of these three lessons of warfare, there is no doubt that *unity of command* is the most vital and paramount teaching,

assuming of course adequate equipment and accoutrements of war at the disposal of the combatants. War is *organized* force. The higher the degree of organization, the more effective the military machine. The day has long passed when Minute Men could influence the course of battle. No longer can a nation respond overnight to the threat of impending invasion, and a million men spring to arms. Even in enlightened America citizens cannot be made into an effective armed force without many months of training in the use of modern weapons and the creation of an industry that can supply such munitions largely technical in character in vast quantities. Today the amalgamation of all efforts, military and civil, is essential. The nation must become, as it were, a military unit. The military forces themselves must be activated and coordinated by a single supreme commander. Centralized authority must be had. Lacking that, any military effort will be frittered away in a melange of confusion, waste and demoralization, the inevitable concomitants of uncoordinated effort.

As the European war has become the proving ground for American implements of war, so has it provided arguments for proponents of a separate air force. Thousands of words have been printed and broadcast about the "independent" Nazi *Luftwaffe*, the "independent" Royal Air Force, the lessons of Norway and Crete and so on.

Ordinarily, the gist of these arguments is this: That Germany has an independent air force which has proved remarkably successful, therefore that the United States should establish an air force on the German model.

In order to evaluate this contention we must gain an understanding of the organization of foreign air arms. None can deny that German air fleets have performed admirably in warfare. But can it truthfully be said that *Luftwaffe* successes come from its being an "independent" air force, or from other factors? Can it truthfully be said that the Royal Air Force saved Britain in 1940 because it was an "independent" air force? Is it in fact true that the independence of these air forces is the primary reason for their achievements? Or is it even true that these foreign air forces are in fact independent? These considerations cannot be appraised accurately without an understanding of the organization of the air forces abroad.

At the outset, it is sometimes startling to realize that *nowhere in the world* does there exist a completely independent air force as would be commonly visualized in the word "independent"! Government seldom functions as pictured on structural outline. For us to understand how a foreign air force functions, we must peer behind the facade of structural outline which cloaks the functioning machinery.

Great Britain has had ample experience with a separate air arm. Until 1937 all military aviation in England was contained in the Royal Air Force. It was a truly "independent air force." A completely self-sufficient organization, the Air Ministry, was its administrative body and, through the Air Ministry, direct contact was had with the British Prime Minister. Despite this independent status, no outstanding achievement can be marked up for British aviation before 1937, although the saber-rattling Nazis had exchanged butter for guns and were spending millions to create an air force of overwhelming power. Needless to say, English failure to build up an adequate air force at this time is a strong indictment of the "separate air arm." The British undoubtedly knew, as did many people in the United States, of the progress being made by Hitler toward the rearming of Germany and the building of a super-military air force. It is reasonable to suppose, in the light of this advance knowledge, that those administering Great Britain's "independent air force" at that time would have taken cognizance of Germany's moves, bringing the matter to the attention of the English people and their Parliament, and through the prestige undoubtedly accorded a separate air force, would have succeeded in obtaining sufficient appropriations to build an adequate air defense. However, British attention was concentrated on internal problems, not on military preparedness. It made no difference whether the air force was subordinate, independent, or non-existent; their eyes were turned away from the unpleasant considerations of a possible war.

But even in 1937 British aviation lost part of its independent status. The British found the task of naval aviation to be entirely different from that of other military aviation. Accordingly, it was deemed advisable to transfer naval aviation to Admiralty control. Three years later, after the terrible destruction wrought by the *Luftwaffe* in the Fall of 1940, it became necessary largely to separate another section of British aviation from the independent Royal Air Force. A Coastal Command was created, despite the pressure of war, which also was placed under a limited Admiralty control. This move was made to provide better protection for British shipping near the British Isles and also to create a stronger offensive weapon to attack German shipping along the Continental Coast.

One month later, in January of 1941, it was discovered that not only is naval aviation distinct from other military aviation, but certain types of air forces are needed to operate closely with ground units. Again the Royal Air Force was modified. An Army Cooperation Command was created to fill this need. Prime Minister Churchill described the problem which gave rise to the Army Cooperation Command in a speech on June 10 in the House of Commons:

"I think it is of the utmost consequence that every division, especially every Armored Division, should have a chance to train in close relationship with the particular number of aircraft that it knows and that it can call on at will—and under its own command for purposes of tactical operations. But it was not possible last year to provide it on a large scale without entrenching on other domains which were even more vital to our safety.

"It is our intention to go forward upon that object immediately and to provide the Army with considerable numbers of airplanes suited entirely to the work they have to do and, above all, to develop all that wireless connection between ground forces and air and military which Germans have carried out to such an extraordinary point of perfection."

Thus has independent British aviation been modified under combat conditions. Naval aviation was needed under Navy control; Army aviation was essential for ground operations. A commander was found obliged to have control over *all* means of military power affecting the success of his venture. To win victories the commander must command the entire military force, not be required to request the *cooperation* of separate, independent components within his command. Unfortunately for the British, such requests for air force assistance had to be made by various commanders during the campaign preceding the evacuation of Dunkirk, again in Greece, Libya and Crete; and with the failure to give ample air support in these instances, world-wide attention was focused on decisive British defeats.

Adjustments such as took place in British aviation were unnecessary in Germany after the outbreak of hostilities. In that country there was no problem of a separate air force to be confronted. All Germany is a military organization, superlatively centralized and geared throughout for the primary purpose of making war. An inflexible, all-inclusive regimentation dominates the Third Reich, its iron grip enfolds the entire nation. Only those things are permitted to exist which redound to the good of the German State. In so highly integrated a society as that of Germany, it is therefore impossible for any human activity to attain even a semblance of what is customarily associated with the word "independent."

As for the military establishment itself, if indeed it can be disassociated from the rest of Germany, the great General Staff reigns absolutely supreme. The result is, that there is but one true military arm in Germany—*der Wehrmacht*—"the Armed Force." There are, however, three branches of this armed force: the Navy, Army and the Air Forces. The division between them is largely for administrative purposes and is non-existent in actual military operations.

When German forces go into combat, invariably they are employed as a single unit under a single commander who is

appointed by Hitler personally. The commander for any particular operation may be taken from the Army, Navy or Air Forces, depending upon the nature of the campaign. For example, an Army general of Infantry background, General List, was in command of all German military components engaged in the Balkan campaign; an Air Force general (Loehr) was in command of the Cretan campaign; and General Von Falkenhorst from the Field Artillery was commander of the operations in Norway, having full command over the German land, naval and air forces that were used in such perfect unison in this campaign.

Therefore, while it would appear, from our structural outline, that there exists an independent Army, an independent Navy, and an independent Air Force in the German military hierarchy, we find that they merge into one military force when engaged in battle. Von Brauchitsch (Army), Raeder (Navy) and Goering (Air Forces) are in fact subject to the Great General Staff under the Chief of Staff Keitel who, in turn, is responsible to the Commander-in-Chief, Hitler.

In such a system as this it is an exaggeration to characterize the German *Luftwaffe* as an "independent" unit. Moreover, the German air forces have demonstrated time and again their striking power and worth, not by functioning as an independent arm, but have made it possible for the land forces to achieve great victories by the fullest coordination with infantry, armored and mechanized forces under control of the task force commander. All of us are familiar with the German strategy — aircraft blasting and destroying enemy communications, lines of supply, troop concentrations ofttimes great distances behind the enemy lines; fast-flying, heavily-loaded bombing airplanes dropping their deadly loads on enemy fortifications, artillery emplacements and defense installations; low-diving *Stukas* blasting a path for the tanks, mechanized units, armored cars and the supporting infantry immediately following; removing enemy resistance so that support that could go forward and take and hold ground might do so without difficulty and with a minimum of casualties. Such operations are the result of the fullest coordination of activity. Weeks, months and even years of intensive training are imperative for a smooth-working organization of armed forces, which has the one-all-important objective—a swift, devastating defeat of the foe. Poland, Norway, the Low Countries and France, all have experienced this remarkable demonstration of armed might operating under complete unity of command and with every service cooperating. We may deplore Germany's present government, with the suffering it has inflicted on the world, but we must fully recognize that its successes have been due, in the largest part, to its complete integration of all of its armed forces—not through the separation of units operating independently of each other. An air force which has been trained to assist the Infantry, Artillery and Armed Force team on the ground is familiar with tactical formation of all types of operations. This same air force can always, if the situation demands, carry out independent missions. The reverse is not true.

Merely in order to complete our picture of foreign air force organization, it is interesting to note that the French system closely parallels that of England, while that of Italy is a prototype of the German system. In France, the Air Minister is a member of the Supreme Council of National Defense and is directly subordinate to the Minister of National Defense. The Italian armed services have a supreme general staff on the German model, with Mussolini as commander-in-chief. Neither of these air forces has been signally successful, although they fall into the general category of "unified" air forces desired by proponents of a separate air force in this country.

The Russian and Japanese air forces operate from structural foundations different from any of those previously mentioned. In Russia, the air force is an integral part of the Russian Army. The Japanese have an air force similar to that of the United States in organization. This may be attributed in part to the fact that Japan must protect a large navy, as does the United States.

The German system of aerial warfare has been the most successful thus far in the current struggle overseas. Its impressive list of accomplishments since the invasion of Poland in September, 1939, has resulted in a movement to create an American *Luftwaffe* in the image of the German model. It would be wise for us to examine this proposal in the light of governmental conditions peculiar to the United States.

It is almost a commonplace to state that European practices cannot be carried *in toto* to our shores and function as in Europe unless the governmental machinery permitting the practice also is transplanted to this country. To adopt the German military hierarchy would involve considerations repugnant to citizens of this land and would be foreign to our conception of a democratic state. An "independent" air force as a prototype of the Nazi *Luftwaffe* necessarily would require the creation of a supreme General Staff also on the model of the German General Staff. Lacking such a directive body to synchronize land, sea, and air forces into a cohesive military force, American military organization would be fatally crippled and rendered incapable of delivering a knockout blow by a combination of forces. Our military structure is founded on cooperation, not compulsive coordination. We have had a War Department and a Navy Department throughout our national existence which must *cooperate* in the furtherance of our national military objectives under the direction of the President. Proponents of a separate air force advocate a Department of Aviation in order to sever all supervision of military aviation from Army or Navy control. Thus would be established yet a third Government Department whose relation to the Army and Navy also would be based upon cooperation.

We thrill to the talk of operating in three dimensions, on land, on sea and in the air. But do we stop to think that air is more or less the same over both land and sea? We have a very efficient fleet air arm. Many experts declare it is the best in the world. Policies of procurement of aircraft and aeronautical supplies have been coordinated so there is unity between our Army and Navy and the British Government. Operating policies of the Army and Navy are arranged through a joint board which determines policy regarding seacoast, off-shore base and island defense. Generally the Navy air force operates in waters offshore. The Army Air Force is building up a splendid force of long range, land-based planes capable of striking sledge hammer blows at any forces that might attempt to establish bases in this hemisphere capable of being used for operations against the United States or its possessions. So that in time of actual trouble you would see Army and Navy planes as well as troops and warships acting as a task force if trouble came within the territory for which the United States is responsible.

To dispense with the present military organization of the United States would require the redesign of the entire defense organization now functioning within this country. It would be extremely dangerous, if not foolhardy, to attempt a major change of this sort without the assurance that this country will not be actively involved in a war during the period of change. To attempt it in the face of possible active operations, would be insanity. Secretary of War Stimson was conservative in stating, "It would seem to be obvious that it is neither prudent nor desirable to undertake such a major governmental reorganization in the midst of a national emergency."

The problem of coordinating three separate military components, land, sea, and air, therefore, would be a staggering proposition facing the American military commander. Furthermore, the creation of a self-sufficient air force entails

the taking over of all its necessary housekeeping and servicing functions at a time when our Air Force is experiencing a tremendous and continually accelerating expansion. These functions have been performed for years past by various Regular Army components which have developed high skills in this specialized type of duty. Army Engineers construct the landing fields, the technical buildings and camouflage the military installations at Air Bases. The Signal Corps provides highly technical communication devices adopted for aircraft purposes. Ordnance Department personnel is required at each Air Base to supervise bomb loading, maintain the operating efficiency of the cannon and machine guns installed on aircraft, and develop new types of weapons suitable for aerial warfare. The Quartermaster Corps and Medical Corps perform indispensable services by providing shelter, food, clothing and medical attention to Air Force personnel. Chemical Warfare Service personnel must be at hand to supervise the decontamination of air force installations which have been subjected to chemical attack and to arrange for the use of toxic chemicals whenever necessary.

The services performed by this Regular Army personnel are vital to the successful operation of the Air Force. The derangement incident to the divorcement of these services from the Army would produce disorder, waste and confusion, in addition to the problems which unavoidably would arise in the establishment of an entirely new method of supply.

There are, therefore, very serious problems incident to the adoption in this country of European military organization. United States air organizations must be based upon American practices and governmental conditions—as English air organization is based upon English governmental conditions and as German air organization is derived from conditions peculiar to Germany. This is sheer common sense. Our objective is not to copy foreign military organization, but to develop from our own system of government and traditions a military machine more powerful than those in Europe. The *organization* of a military machine is not the important consideration; we are concerned with its *effectiveness.*

Our military air observers abroad have concerned themselves with the reasons for the *Luftwaffe* effectiveness. Their conclusions have been that overwhelming numbers, highly-trained personnel, superior aircraft in many instances to those of their enemies and a split-second timing with other German military components have produced its successes. Instead of reorganization of its entire military organization in view of these successes, this country has adopted within its present establishment certain modifications and improvements which will render its aerial arm superior to any in the world. The reorganization will give us the *results* obtained abroad; we are not interested in an unnecessary and dangerous reconstruction of our defense organization on a foreign model when the results are obtainable without it.

As reorganized, the former GHQ Air Force and the Air Corps are unified into the Army Air Forces under a Deputy Chief of Staff for Air who in turn is responsible to the Army Chief of Staff. Our Army Air Forces are organized into the Headquarters Army Air Forces, the Air Force Combat Command, the Air Support Commands, the Air Corps and all other air units.

This reconstitution of our Army aviation has created a unified Air Force which embodies the strengths of European air forces as adapted to governmental conditions peculiar to this country. Our Air Force Combat Command is a powerful, long-range striking force, controlling all Army aerial operations except those units attached to task forces, overseas garrisons, or to other commanders. The Deputy Chief of Staff for Air is the advisor to the Army Chief of Staff on all matters concerning Army aviation and holds a comparable status with other Deputy Chiefs of Staff who coordinate the ground forces and services. Each of the five Air Support Commands contains all aviation elements that a ground force needs to achieve local air superiority, thereby making possible that perfection of coordination which has characterized the use of the *Luftwaffe* with *panzer* troops. An Air Council also has been established to review and coordinate major Army aviation projects.

Thus has been created an air organization autonomous in such a degree as to ensure unity of control and, at the same time, capable of obtaining the joint action of air, ground and naval forces which the progress of the present war has revealed to be so imperative for successful military operations.

There has been frequent reference, by those who are urging an independent air force, to the views of that great pioneer of air power Brig. Gen. William Mitchell. All that has been written has implied that if General Mitchell were alive today he would be at the forefront fighting for the complete separation of the air arms from the Army and the Navy and the creation of a separate department of Air.

There is no doubt that General Mitchell advocated the creation of a unified air force which would be independent of Army and Navy control. At the time he was making his fight for an independent air force, however, there was little recognition by the world's military and naval leaders of the tremendous potentialities of air power. Further, he was not urging such a far reaching change in organization during a critical period of emergency and at a time when there was a chance that the country might soon be involved in a war. Up to the time of the Mitchell controversy, air power had been merely considered by many as an agency which might be useful to ground troops by helping them to move forward in battle and to naval forces by providing observation for gunfire and perhaps by operating against small hostile naval craft. Today the situation has changed. Our military and naval leaders appreciate the tremendous capabilities of the air arm. The fact that the War Department has recognized the great importance of air power is evidenced by the sweeping change in organization which places the development and application of air power in the hands of the Army Air Forces.

Of course, no one can possibly know what another might do under a given set of circumstances. General Mitchell, however, was not only a far-sighted leader in air matters. He was a patriot. I cannot believe he would rock the boat at a time when the waves are already high. Nor do I believe that he would seek to set up an additional department with all its complications and duplications to gain the name of independence when he already had the substance in an autonomous air force within the existing organization.

I saw a great deal of him from 1934 to 1936, especially during the House investigation of aircraft procurement. I talked with him frequently and was very much impressed with the soundness of his views on air power. I doubt very seriously that General Mitchell, if confronted with the present organization of our Army Air Forces would in the light of events within the last two years, demand any additional changes. I believe that he would agree that the present organization of the War Department provides for that independent use of air power against strategic objectives for which he fought so strongly.

It is important for us to remember that the success or failure of an Air Force is determined by the conditions of its employment in combat in conjunction with other military components, irrespective of its organization. The terminology —separate, independent, or unified air force—is inconsequential; our concern is the destruction of enemy military power and the creation of a military machine capable of performing that function. It is my belief that the reorganized autonomous Air Force of the United States embodies these essentials for successful warfare as it now stands and that any change to a separate or independent Air Force would be inimical, for the reasons stated above, to the military efficacy of the United States.

# A Separate Air Force Would Be Fatal

By Melvin J. Maas

Congressman from Minnesota

Rep. Melvin Joseph Maas (Republican) was born in Duluth, Minn., May 14, 1898. He attended public schools in St. Paul, Minn., later was graduated from St. Thomas College and took advanced work at the University of Minnesota.

In 1917 he joined the U. S. Marine Corps aviation branch and spent 21 months in the service, including 10 months overseas. He remained in the Marine Corps Reserve and today holds a colonel's commission. He organized and commanded a Marine Corps dive-bombing squadron for 11 years.

Colonel Maas was elected to Congress from the Fourth District of Minnesota in 1927. He has been a member of the House for 15 years. In 1932 he received the Carnegie Silver Medal for disarming a maniac in the House of Representatives. He holds a commercial pilot's license.

At present he is the senior minority member of the House Naval Affairs Committee. He has just completed six weeks active duty with the U. S. Fleet on maneuvers in the Pacific.

Colonel Maas is probably the most respected aviation authority in the House. According to the poll appearing on page 37, most members would seem to disagree with his present views on the organization of a separate air force.—Ed.

THE lessons taught by the gigantic battles in Europe during the past two years lead, in my opinion, to only one tenable conclusion: namely, that it would be most unwise and might well be tragic for us to establish a separate, independent air force for the United States.

Superiority in air power must be attained and forever maintained if we are to live in peace in a world at arms. I yield to no one in my desire to attain this goal for America. Several years ago I obtained, after a fight on the floor of the House of Representatives, the adoption by Congress of an amendment to the Navy Bill, making the then maximum 3,000-plane limit of the Navy the minimum instead. Last year, I secured passage of an amendment again offered on the floor of the House, raising the Navy plane limit from 10,000 to 15,000. I am and always have been an ardent advocate of air superiority for the United States.

But I believe the creation of a separate air force, with the confusion bound to result in the new air arm itself and the Army and Navy from which it would be separated, would be unwise at a time when all our effort should be directed toward producing and training our air arm. Delay of a few months —a few weeks, even—might bring tragedy. So quickly are decisions in modern war won or lost.

In the marvelous organization of the German air force we see an example worth emulating. However, we must realize that Germany started from scratch and built her air arm from the ground up. She had time to experiment, to try another method if the first did not work. She had time for trial and error which we do not now have. We have not a moment to waste. The weeks and months such a reorganization would take could never be regained.

As a matter of fact, few of the advocates of a separate air arm who speak so glibly of the change have any idea whatsoever what a complex mechanism a military or naval organization actually is. Just the administrative paper work that would be necessary to effect a change in the physical property involved is something to contemplate. Add to that the routine procedure evolved in the Army and Navy over the period of their histories, and which would have to be established almost at once in a separate air force, and the difficulties mount.

Most important of all would remain the delicate business of jurisdiction and cooperation. The job of assigning jurisdiction over certain overlapping jobs, many of which are arising every day and establishing responsibility for their accomplishment, is a difficult one under present circumstances. In setting up an entirely new military establishment it would be practically insuperable. All three services would be in chaos.

The public has been deluded. The idea of a separate air force co-equal with the Army and Navy has great public appeal and sounds logical on its face. Proponents of the separate air arm have claimed that such a force would magically provide the air superiority so essential to winning battles today. Germany is cited as *the* example. Let me cite two others: England and France. They had separate air forces, too. Yet, when the crisis came, they were vastly inferior in number and available types of planes and in training to Nazi Germany's *Luftwaffe*. No, a separate air force is *not* the answer.

Actually there is not even the remotest connection between a separate air force and air power. Air power is the amount and effectiveness of the air component of a nation's military and naval services. A separate air force is merely a method of organizing military and naval aviation. The watchword of the successful operations of the Germans in Poland, Norway, Holland, Belgium, France, the Balkans and in Russia was a single word—coordination. It was the same in September, 1939, as it is in September, 1941. It was the watchword of the successful defense in the Battle of Britain as it is today with the Russians on the Eastern Front. It must be the watchword for us, too. But coordination is not contingent upon a separate air force.

Coordination means the fullest support of all three arms, land, sea and air, each with one or both of the others, for the accomplishment of some task. What we need is not further separation of the three components than we now have, but closer cooperation.

The time may come—and personally I feel very strongly that it will come—when military and naval aviation will not bear the same relationship to our Army and Navy that they do today. I believe the time is now virtually at hand when experience in aviation will be a prerequisite to all high military or naval command. I can visualize the time when air

will be the main striking force. Although a realistic examination of our peculiar military problems does not indicate that a separate air force fits our needs under present circumstances, I am not one of those completely satisfied with our present setup. I believe many changes should be made, some of them radical departures from our present policies. Before setting them forth, let me explain the reasons drawn from my own personal experience as an aviator why they should be made along other lines than creation of a separate air force.

In its initial, critical stages, in my opinion, 90 per cent of the military problem of the United States, say for the first six months, is naval. Naval aviation is just as distinct from Army aviation as the Navy itself is from the Army. It merely happens that military and naval pilots employ the same element in their operations, the air. This is no proof that aviation is in itself separate from either the Army or Navy. Both the Army and Navy use gunpowder as their chief weapon. This does not mean that they should be consolidated. If 90 per cent of our military problem is naval, then it stands to reason that 90 per cent of our aviation problem is naval aviation.

No one expects a thoroughly trained, competent Naval aviator to be a competent Army aviator, or vice versa. The training, the mission and the target of the naval and military aviator are entirely independent of and unrelated to each other. In the one case the target is a naval target, in the other, a ground target. The average human being has done all he is capable of when he has become a competent, well-trained naval aviator, experienced in naval navigation, naval missions, naval tactics and the ability to recognize and differentiate from great altitudes not only all types of surface vessels but also the silhouettes of every type of vessel of every different nation's navy.

An Army aviator has accomplished all the average human being can when he becomes experienced in land-flying navigation, Army tactics, military formations and in ability to recognize, estimate and properly report the size of troop units, their tactical maneuvering and to most effectively interfere with their operations by machine-gunning or bombing. Try to make a naval and a military pilot out of the same individual and you'll make him neither one. One of the tragedies of the British campaign in Norway that cost them the Battle of Narvick was that their separate air force was neither trained nor equipped for naval aviation and cooperation. The British Navy had no control over the Royal Air Force. The RAF had no control over the aircraft carriers. The world knows what happened. The RAF pilots, in many instances, were unable to distinguish their own ships from the German. Result: British ships were too often bombed by their own pilots.

I have had some experience and background along this line perhaps not enjoyed by any other individual. I was in the Marine Corps aviation during the World War and have been an active pilot in the Marine Corps Reserve virtually ever since that time. I commanded a reserve squadron of dive bombers for 11 years. I am still an active Naval aviator in the Marine Corps, so that I get both the problem of the Navy and of the Army, since the Marine Corps has elements of both. At the same time, for the past 15 years, I have been a member of Congress and have dealt with the over-all problem of national defense in its entirety. As a member of the House Naval Affairs Committee, I have had an opportunity to have close contact with the relationship of naval aviation to the rest of the Navy.

I can well see how aviators, seeing only the air problem, can conscientiously believe that military aviation should be organized independently of the Army and Navy. I can see also the problem in high command of the absolute necessity for complete unity of command over all elements engaged in an operation. As an active military aviator, I know the limitations of aviation as well as its capabilities. From my own experience, I can say there is no more relationship between naval and military aviation than between the Navy and Army. The only similarity is that they both use planes.

Creating an independent air force, with a separate cabinet officer, far from solving our problem would add greatly to its complexity. It would further decentralize military forces when our crying need is to obtain unity of command. Modern warfare does not permit the time necessary to go through all the red tape of dovetailing diverse military and naval forces administered through independent control and coordinated only by the President through civilian secretaries of War and Navy. To add a Secretary of Air would be just adding another civilian administrator whose efforts would have to be coordinated with the other two.

The time factor is all important. The time required to reorganize our entire military forces, divorcing aviation from both Army and Navy, and to set up a separate cabinet department would bring our aviation progress to a standstill for a considerable period of time. Chaos would result during that period, not only for the air forces being created, but for the Army and Navy as well. Such a period might be the very opportunity that would be seized upon by a hostile power to engage us in military operations, for which we would be totally unprepared. Adding another cabinet officer would simply further divide the very limited time of the President, time which cannot be spared certainly, under present circumstances. Many new military problems would have to be presented to the President, and instead of merely consulting with two cabinet officers in national defense matters, he would have to consult with a third.

Rather than divorcing aviation from the Army and Navy, the need now is to indoctrinate the entire Army and Navy with aviation. It is becoming increasingly essential that all high command, either on land or sea, be exercised by officers trained in aviation. To be practical and effective, however, these same aviators must also be Navy and Army officers in the broadest sense of the word. A military aviator, no matter how excellent a pilot or air commander, is no more fitted to direct land or sea forces than the non-aviation-trained field or sea commander is fitted to direct air activities. To set up an air force now would prevent or retard the present trend toward ultimately putting all high land and sea commands in the hands of aviators. It would deny aviators the opportunity to direct anything but airplanes. It would shut the door to the present tendency to indoctrinate the whole Army and Navy with the importance and value of air power, a desirable tendency which should be speeded up and not choked off.

I had the experience while on active duty this summer as a colonel in the Marine Corps aviation section of seeing a great combined naval task force commanded at sea by an aviator. Under his command were battleships, cruisers, destroyers, auxiliaries of all types, two-thirds of the American Navy. That mighty battle fleet was maneuvered, I believe, as it never had been before. I was serving on the staff of Vice Adm. William H. Halsey, an aviator who constantly pilots his own service-type plane and does it extremely well. I know, because I have been his rear seat passenger. I stood on the bridge of the flagship with Admiral Halsey—and the flagship, by the way, was an aircraft carrier—when he was ordering intricate maneuvers for the mighty armada he commanded.

When I checked up, I found that every officer on the operating staff, from the admiral down, was an aviator. But, they were also naval officers. That task force not only got the greatest possible effective employment from the aviation attached to the force, but the fleet got the maximum protection against hostile air attack because the fleet was commanded by an officer who knew surface craft from every angle and knew aviation as well.

To carry this point further, the commander and key ad-

mirals of the Atlantic fleet are aviators. The commander-in-chief is Adm. Ernest King, and the new commander of the vitally important Caribbean Naval District, Rear Adm. John Hoover, is an aviator as well. The Marine Corps has two aviator-generals, Ross E. Rowell and Roy S. Geiger, both of whom have flown in actual combat.

In the Army, the appointment of Maj. Gen. Frank M. Andrews, one of the pioneers of the Air Corps, to command the Caribbean area including the Panama Canal and the new island bases along its approaches, is ample evidence of this trend in our land forces. Aviation is coming into its own.

Congressman Maas is widely known among Army, Navy and Marine men for his ability to inspect a standard rifle holding it in one hand.

The way, then, to get full recognition for air power is not to set up a divorced and orphaned air force to battle the Army and Navy for its proper needs, but to permeate the whole Army and Navy with aviation doctrine and gain united support behind aviation.

The outstanding lesson of this war is that battles are won, not by individual stars, but by close teamwork. Let's make the United States the greatest military team in the world. To accomplish this we need greater coordination and unity of command and less separation and competition between the three components of our armed forces. I have introduced a bill into the present Congress, which I am perfectly willing to admit may not be the last word in accomplishing this end, but which I hope will be at least a beginning. It will serve to show what I believe is a vital need today, joint staff control of operations affecting Army and Navy. The bill, H.R. 3151, proposes to create a National Defense Staff Corps and a Joint War Staff.

Briefly, the National Defense Staff Corps would consist of 100 officers in time of peace, a number set by the President in time of war, chosen 50 per cent from the Army, 40 per cent from the Navy and 10 per cent from the Marine Corps. They would be permanently assigned to the corps and sever all their connections with their former services in order to give them an impartial viewpoint essential to planning the broader aspects of our national defense. They would no longer be officers of the Army or Navy with all that involves in the ties of class relationships dating back to West Point or Annapolis, or the glory of either service. They would be officers of the National Defense Staff Corps, qualified by reason of their military or naval training but dedicated to the task of organizing a national defense plan. At the head of this corps would be a Director of National Defense appointed by the President by and with the advice and consent of the Senate from among the officers of the Corps for a period of four years. He would hold the rank of field marshal.

The active list of the corps would be divided into the grades of councilors of national defense with the rank of major general, deputy councilors with the ranks of brigadier general, colonel, lieutenant-colonel, major and captain. After the original establishment of the corps, appointments would be made in the rank of captain only and promotion would be by selection.

According to this bill, the Joint War Staff would be composed of the Director of National Defense, the three councilors of national defense, the six deputy councilors and a representative of the State Department detailed by the President.

The functions of the Army and Navy War Colleges would be transferred to the Joint War Staff to provide the nation with a permanent high command that would function in war as well as peace to prepare war plans and coordinate our land and sea forces. We have coordination now to a certain extent through joint Army and Navy boards. But their members are still representatives of the service from which they are detailed and thus subject to all the prejudices and pressures of their respective branches and responsible to the higher authority which appointed them. Appointment in the National Defense Staff Corps would remove them from the position in which they have to answer to higher authority in their own service. In time of peace, the Joint War Staff would determine whether an Army or Navy officer should be in command of specific tasks and have direct command and supervision over all joint exercises to train Army and Navy forces in joint operations. In time of war, the Staff would have direct command over all operations involving both the Army and the Navy.

The purpose of this bill is to establish in time of peace what will be necessary in time of war, a high command for conduct of operations against the enemy. We should not wait for war to come to bring about the coordination that modern battle tactics demand.

Our present policy, developed over a period of many years, is that of "paramount interest" in deciding whether the command of a joint operation should be exercised by an Army or a Navy officer. The tendency has been during the past year or two, however, to establish "task forces." The nature and mission, rather than paramount interest, which can be and sometimes is a moot question, is coming to be the decisive factor in determining from which service and which arm the task commander should be selected. More and more, I believe, task commanders will be aviation trained officers. This

belief is borne out to a certain degree even today in the prominent place aviation officers are being given in our rapidly expanding defense forces. To me this seems a much better method of utilizing our flying officers than to set up a separate branch.

This is the type of reorganization I believe in. It is less spectacular than a sweeping order establishing an independent air force. Nevertheless, I believe it will be more effective in the long run. If we merely analyze the situation accurately, we will find that our air forces are being reorganized. The reorganization is going on gradually and without any fanfare so that we hardly notice it.

While creation of a National Defense Staff Corps is somewhat of a departure from our present peace time policy, it could be effected with a minimum of confusion because of the small number of officers involved. On the other hand, it would be a great improvement over the present system. Today, conflicts of interest between the Army and Navy must be settled by the President, in his capacity of commander-in-chief of both forces. He must be guided by and at the same time make a choice between his Chief of Staff and Chief of Naval Operations. Before he is through, he may have to mollify the Secretary of War or the Secretary of the Navy, perhaps both. If we had a National Defense Staff Corps, the head of that organization would be the military head of our armed forces and chief military adviser to the commander-in-chief, the President. Such an officer would be impartial as between the Army and Navy. This would simplify the President's problem in making decisions and give us in a democracy a unity of military command equal to that now exercised only in the totalitarian states.

The supreme command, of course, would still be in civilian hands. The final decision would still be the President's. But this setup would give us a unity of effort equal to any of our probable enemies.

While the need in the higher brackets of command is for unity, I believe that the air services in both Army and Navy should be given free rein for development and greater autonomy, but within the Army and Navy. The organization I have in mind is similar to the status of the Marine Corps in the Navy. The recent reorganization of the Army air forces was announced as a step in that direction. Whether it will prove to be so in practice remains to be seen. I hope my impression that it was a superficial reshuffle to head off agitation for a separate air arm is wrong and that the new setup will mean an opportunity for greater development of this all-important arm. But in the Navy, the air service is for the most part merely a procurement organization. It has no striking force to compare with the Air Force Combat Command, formerly the GHQ air force. The demands of modern warfare are such that such a striking force must be established if the Navy is to fulfill its function in our expanding defense picture.

The problem of hemisphere defense will require prompt action in event of emergency in far distant areas, reached most effectively by our naval forces. It is vital, therefore, that our Navy have a striking force capable of establishing bases for airplanes and protecting those bases once they are established. This would mean a radical change in policy, since our naval air forces are limited to those required with the fleet and for long range reconnaissance in support of fleet operations. But drastic situations require drastic measures. We cannot be guided by the dead hand of past policy when our situation obviously calls for more modern methods.

As a basis for this striking air arm to operate with the fleet, we will need a force of not less than 4,000 or 5,000 airplanes, sufficient to give air superiority temporarily in any given sector. What this would have meant to the British in Norway! Such a force would require at least 100 aircraft carriers. While construction of such a fleet of modern carriers, capable of transporting 100 airplanes each, would be a matter of several years, there are many ships available which could be converted to this use. They could carry a much smaller number of planes, but could be made ready for use with a few months' work.

A naval striking force, however, should not be limited to planes of the type designed to operate only from carriers. Because of technical requirements, carrier-based planes can never equal the performance of land-based planes pound for pound and horsepower for horsepower. Hence, it will be necessary to provide this force with land planes of all types, up to and including four-motor bombers of the *Flying Fortress* type. When this force strikes, it must hit hard. It must be capable of a knockout blow.

These planes will require land bases from which to operate, if necessary in South America, the Philippines, or even Singapore. That means additional men, more Marines to establish and protect the airdromes. The present policy of having the Army protect and maintain air bases is inadequate in warfare today. Figuratively speaking, an airdrome may be here today, gone tomorrow. Decisions must be made on a day-to-day basis leaving little or no time for coordination with other forces.

The present policy regarding our coastal defense is another that will bear reexamination. This is now the job of the Army. It is a very complex problem involving elements of the Air Corps, the Coast Artillery Corps and various Navy units. The British have assigned the job to the Coastal Command of the RAF, but it is understood to be an unsatisfactory working arrangement and there is reason to believe that discussions are under way with a view to turning the whole job over to the Royal Navy. I do not say this would be the proper solution to our problem. Obviously, however, it is a question that should be taken up in the light of developments abroad.

One of our greatest errors to date, I believe, is our failure to modernize our coastal command. Our only coast defense consists of antiquated coast artillery guns, inadequate railway guns and uncoordinated Army aviation. The coastal command must include in addition various naval units, such as destroyers, trawlers, mine layers, mine sweepers, submarines and perhaps heavier units. Coastal defense in England was an RAF assignment at the beginning of the war, but the complexity of the problem soon brought many changes in the original setup.

For the United States, the crux of the defense problem is coastal defense, either of our own shores or those of some of our hemisphere neighbors. That will place the heaviest responsibility on naval aviation, since the principal targets will be naval targets.

This is why the Navy should have a large force of *Flying Fortresses* as an integral part of its air component. Bombing moving targets at sea is vastly different from bombing known, fixed positions such as cities, rail centers, or industrial areas. The Navy is thoroughly trained already in operations against naval forces. The Army will have its hands full preparing the equipment and training the personnel for its land missions.

Whatever the answer to these perplexing defense problems, they should be approached with one purpose in view, securing greater coordination. We must not be guided by superficial considerations in such a vital matter as this, or popular, "armchair" strategists.

The Battle of Crete, for example, has been heralded as a pure air victory. It was not. It was a victory for air transport. The Germans did not gain Crete by preventing the British from reinforcing its island garrison. They did that, but in the final analysis they took Crete by landing troops, by air to be sure, and fighting a land battle, just as they did in France.

Coordination of all combat arms, land, sea and air, is what will bring victory. The best way to accomplish coordination is to develop the combat team, not separate its individual members. That way lies confusion, perhaps even defeat.

77TH CONGRESS
1ST SESSION

# S. 1635

## IN THE SENATE OF THE UNITED STATES

JUNE 16 (legislative day, JUNE 10), 1941

Mr. MCCARRAN introduced the following bill; which was read twice and referred to the Committee on Military Affairs

# A BILL

TO establish a Department of Aviation, to consolidate therein the activities of the Government relating to military aviation, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that there is hereby established at the seat of government an executive department to be known as the Department of Aviation, which shall be administered by a Secretary of Aviation, who shall be appointed by the President, by and with the advice and consent of the Senate, and who shall receive the same compensation as other heads of executive departments.

(b) Section 158 of the Revised Statutes is amended to include the Department of Aviation, and the provisions of title IV of the Revised Statutes, as now or hereafter amended, shall be applicable to the Department.

(c) The Secretary of Aviation shall cause a seal of office to be made for the Department of such device as the President shall approve, and judicial notice shall be taken thereof.

(d) There shall be in the Department of Aviation an Under Secretary of Aviation and two Assistant Secretaries, to be appointed by the President, by and with the advice and consent of the Senate, who shall perform such duties as may be required by law or prescribed by the Secretary of Aviation. The Under Secretary shall receive compensation at the rate of $12,000 per annum, and each Assistant Secretary shall receive compensation at the rate of $10,000 per annum. There shall also be in the Department such other officers and employees as shall be transferred to the Department of Aviation under this Act, and such other officers and employees as may from time to time be provided for by Congress.

SEC. 2. (a) The Department of Aviation shall have jurisdiction over the activities of the Government relating to military aviation, and over the operation and maintenance of the Air Force hereinafter established, the servicing and supplying of such Air Force, and the procurement and training of its personnel.

(b) The functions, powers, and duties vested in and imposed upon the Secretary of War and the Secretary of the Navy with respect to aviation are hereby transferred to and vested in and imposed upon the Secretary of Aviation, and any power which the Secretary of War or the Secretary of the Navy has heretofore been authorized to exercise may be exercised by the Secretary of Aviation in any case where the exercise of such power is necessary in connection with matters within the jurisdiction of the Department of Aviation.

(c) There shall be transferred from the Department of War and the Department of the Navy to the Department of Aviation such civilian personnel, such real and personal property (including office equipment), such records, and such unexpended balances of appropriations, as the President shall determine and specify by Executive order.

SEC. 3. There is hereby established under the jurisdiction of the Department of Aviation a separate branch of the armed forces, to be known as the Air Force. The Air Corps of the Army and the Naval Flying Corps and all that pertains thereto (except commissioned officers) are transferred to the Air Force. The President shall be Commander in Chief of the Air Force.

SEC. 4. (a) There shall be in the Air Force commissioned officers of such number as the President may determine to be necessary. The President is authorized to establish appropriate grades for such commissioned offices and to prescribe titles for such grades.

(b) The President is authorized—

(1) to appoint, by and with the advice and consent of the Senate, to the commissioned offices in the Air Force officers of the Air Corps of the Army or the Naval Flying Corps, and such other individuals as the President may determine to be fitted to perform the duties thereof;

(2) to prescribe the pay and allowances for the offices created by subsection (a) until otherwise provided by Congress.

(c) Upon the taking of office by any officer of the Air Corps of the Army or the Naval Flying Corps, appointed under authority of subsection (b), the office held by him in the Army or Navy, as the case may be, is abolished and the authorized strength of such branch of the national defense is reduced accordingly.

(d) Notwithstanding the provisions of Section 3, any officer of the Air Corps of the Army or of the Naval Flying Corps who is not appointed and confirmed is authorized in this section shall continue as an officer of the Army or Navy, as the case may be, without loss of grade or rank.

SEC. 5. The President is authorized—

(1) To establish appropriate grades and ratings for noncommissioned flying personnel and ground personnel in the Air Force, to assign thereto warrant officers and enlisted men of the Air Corps of the Army and the Naval Flying Corps transferred to the Air Force under this Act and other noncommissioned personnel of the Air Force, and to prescribe their pay and allowances, until otherwise provided by Congress, but no such warrant officer or enlisted man shall receive lower pay and allowances in the Air Force than he was receiving in the Army or the Navy.

(2) To make such changes in the titles of and prescribe such new duties for civilian personnel of the Air Corps of the Army and the Naval Flying Corps transferred to the Air Force under this Act as he may deem necessary. The transfer of such civilian personnel shall be without change in classification or compensation.

SEC. 6. All unexpended appropriations in respect of the Air Corps and the Naval Flying Corps shall become available for expenditure by the Air Force and shall be treated as if the Air Force had been originally named in the laws making the appropriations.

SEC. 7. The Air Force shall be so trained as to comprise a combatant force of the United States with a view to operating either with the armed land or sea forces of the United States, or with both combined, or independently of either, as the President may determine. The President is authorized to attach such units of the Air Force as may be necessary for coöperation with the armed land and sea forces of the United States in time of war or threatened hostilities, and during maneuvers, target practice, and such other exercises as may be held by those forces. When such units are so attached, they shall be under the command of the designated commander of the land or sea force, or both, as the case may be. Should the offensive or defensive operation in time of war or threatened hostilities and the maneuver or exercise in time of peace be from their nature aeronautical, the President is authorized to attach to the Air Force such units of the armed land or sea forces as he may deem necessary. When such units are so attached, they shall be under the command of the designated commander of the Air Force.

SEC. 8. (a) Until otherwise provided by Congress, the President is authorized, for the purpose of perfecting the organization and coördinating the activities of the Department of Aviation and of the Air Force created by this Act, (1) to consolidate, eliminate, or redistribute the functions of offices, bureaus, agencies, branches, and organizations, to create new ones and fix the powers, duties, and functions of their executive heads; and (2) to take such other action, not inconsistent with the provisions of this Act, as he may deem necessary.

(b) Insofar as is practicable and not inconsistent with the provisions of this Act, and until otherwise provided by Congress, (1) the administration of the Department of Aviation shall be governed by the laws in force with respect to the Department of War, and (2) the Air Force shall be governed by the laws in force (other than laws relating to relative rank, promotion, and appointment of commissioned personnel) with respect to the Air Corps of the Army and the Naval Flying Corps at the time of their transfer under this Act.

(c) The Secretary of Aviation shall investigate and report to Congress a plan for further perfecting the organization and coördinating the activities of the Department of Aviation and of the Air Force, together with such recommendations for legislation as he may deem necessary for carrying out such plan.

SEC. 9. All orders, rules, regulations, and permits or other privileges made, issued, or granted in respect of the exercise of any function transferred by this Act or by or in respect of the Air Corps of the Army or the Naval Flying Corps, and in effect at the time of the transfer of such corps under this Act, shall, if not inconsistent with the provisions of this Act, continue in effect to the same extent as if such transfer had not occurred, until modified, superseded, or repealed.

SEC. 10. The Secretary of Aviation shall make annually at the close of each fiscal year a report in writing to Congress giving an account of all moneys received and disbursed by him and the Department, describing the work done by the Department, and making such recommendations as he shall deem necessary for the effective performance of the duties and purposes of the Department.

SEC. 11. This Act shall take effect upon its enactment, except that sections 2, 3, and 6 shall take effect on the sixtieth day after the date of their enactment.

**Reproduction of Senator McCarran's Bill S. 1635. An identical bill has been introduced in the House of Representatives by Congressman William H. Sutphen of N. J.**

## I Solo!

by Ned Van Amburg

OF course I like to be flattered, but I've only flown airplanes by myself for one hour and 45 minutes. So I have small claim to being a flyer. The only other flying was the 7 hours and 45 minutes instruction.

Believe me, it was a sensation. Airplanes are not vicious, but they are like horses. You have to decide who's boss; you or the horse. But sometimes a horse knows best. An airplane never does, though it is continually jumping, pitching, shaking the bit, trying to go its way, back to the ground. And you have no friend to help—no ground to support you when the horse wins, no tree to tie a stubborn horse to.

At the time he wrote this short article, the author was an aeronautical engineering student at the University of Washington, Seattle. He wrote it originally in the form of a letter to his mother, Mrs. C. H. Van Amburg of Yakima, Wash. He was then a CPTP seaplane student.—Ed.

You have eight hours in which to learn to rule this amazing Pegasus—to make it carry you through a void. I had had seven hours and 45 minutes— and I knew what was coming when my instructor said,

"No, you're not getting out this time. I want you to take her around a couple of times by yourself." He looked over at me, grinned, gave my arm a good-natured grip as he stepped out of the plane. His hand on my arm was to be my last contact with the intelligence which had been telling me what to do, correcting me and giving me worlds of confidence, for I knew that with him there, we could come to no harm.

As you gun the motor and look ahead of the accelerating plane, across the lake and into the sky beyond, the realization of what you have to do stabs the bottom of your stomach. This is the final test, who's to be master? So you can understand why I sent a telegram, instead of just writing home and saying: "Yeah, I soloed."

But the minute the plane reached speed and tried to bound free of the water I found myself checking instruments, feeling the ailerons, the rudder, to keep me in a true course down the lake and urging back on the stick, to help my plane into the element it was working so hard to get into. There! She's free—watch that nose! Don't let her climb too fast! If the motor should stop, we must be in a position to land smoothly. A bad bump! Level up those wings.

Here's the end of the lake—the gas plant with its big stacks and storage tanks reaching up at us, and my plane and I with plenty of altitude. We can laugh at 'em. Just to show that grim stack what I think of it I pull the throttle back to cruising and rest the motor.

Revolutions 2,300, just right for a take-off. Air speed, 75, that's fine for a steep climb. Oil temperature, 135. Pressure,

(*Continued on page* 106)

# THAT'S NOT NEW . . .

by William S. Friedman

ON October 8, 1938, the populace of London saw the first public test of the balloon barrage. Seven of the 40 "kites" used in the first show broke loose and drifted out of sight. Since that day, Berlin, Paris, Rotterdam and a score of other cities have seen the barrage technique for anti-aircraft defense used with varying success. More recently, the United States, assuming her almost traditional tail-end position on air defense matters, assembled a similar organization.

People with good memories may recall a number of experiments in anti-aircraft curtain technique which were conducted with small success toward the close of the last war. To most people, however, the idea is as new as the blitzkrieg and just as European. Actual research into its origin reveals that the idea was born in Philadelphia before the outbreak of the first World War.

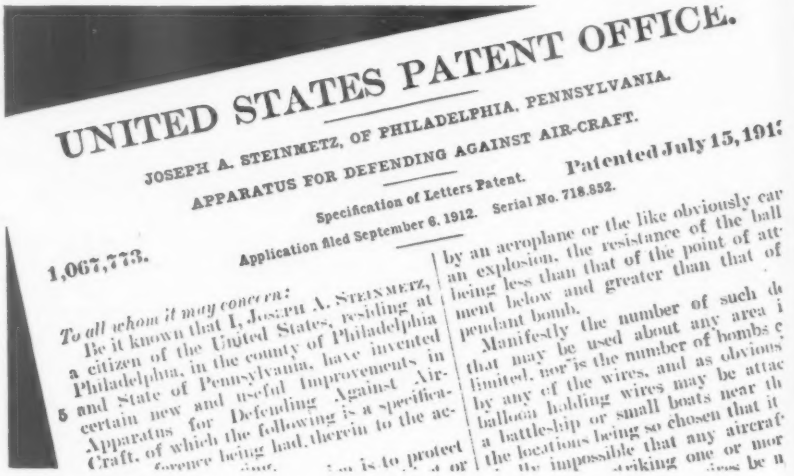
In 1912, Joseph A. Steinmetz filed two specifications for anti aircraft nets with the U. S. Patent Office. One was the forerunner of the modern balloon barrage, differing from the most modern version only in technical improvements of such details as balloon design, winch operation and wire cable composition.

Steinmetz's second idea, which has lain dormant these last 28 years, is being considered in England for actual use, according to the well-informed British house organ, General Aircraft News. The Philadelphian, whose ideas dealt chiefly with combatting Zeppelin attacks (regarded at the time as the chief aerial menace), recognized the limitations of the balloon barrage system. To answer this, an improvement was made on the wire-screen system. It called for a mobile screen, towing grapnels and bombs, capable of destroying Zeppelins or enemy aircraft on contact.

While the British commission, which presented both plans to the Air Ministry before the close of 1939, had no knowledge of the Steinmetz patents, their schemes paralleled the Steinmetz plan in a startling number of points.

The modern version of Steinmetz's system calls for rigging such second-line craft as the Vickers *Wellesley* with special equipment comprising a winch, a parachute in a special container, 20,000 feet of wire and a grapnel with a specially designed bomb on it. Taking off in groups, they could fly to their action stations, lower their screens and operate for several hours—screening a particular area by flying on eliptical patrol between the city that might be a bombing

(*Continued on page* 122)



UNITED STATES PATENT OFFICE.

JOSEPH A. STEINMETZ, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR DEFENDING AGAINST AIR-CRAFT.

Specification of Letters Patent. Patented July 15, 1913.

Application filed September 6, 1912. Serial No. 718,852.

1,067,773.

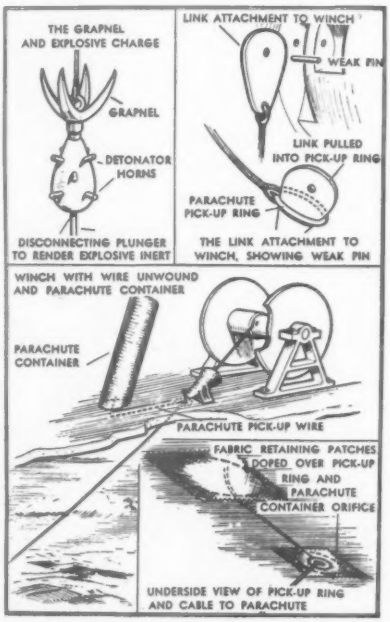
*To all whom it may concern:*

Be it known that I, JOSEPH A. STEINMETZ, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Defending Against Air-Craft, of which the following is a specification, reference being had therein to the ac-

... is to protect ... by an aeroplane or the like obviously car... an explosion, the resistance of the ball being less than that of the point of att... ment below and greater than that of pendant bomb.

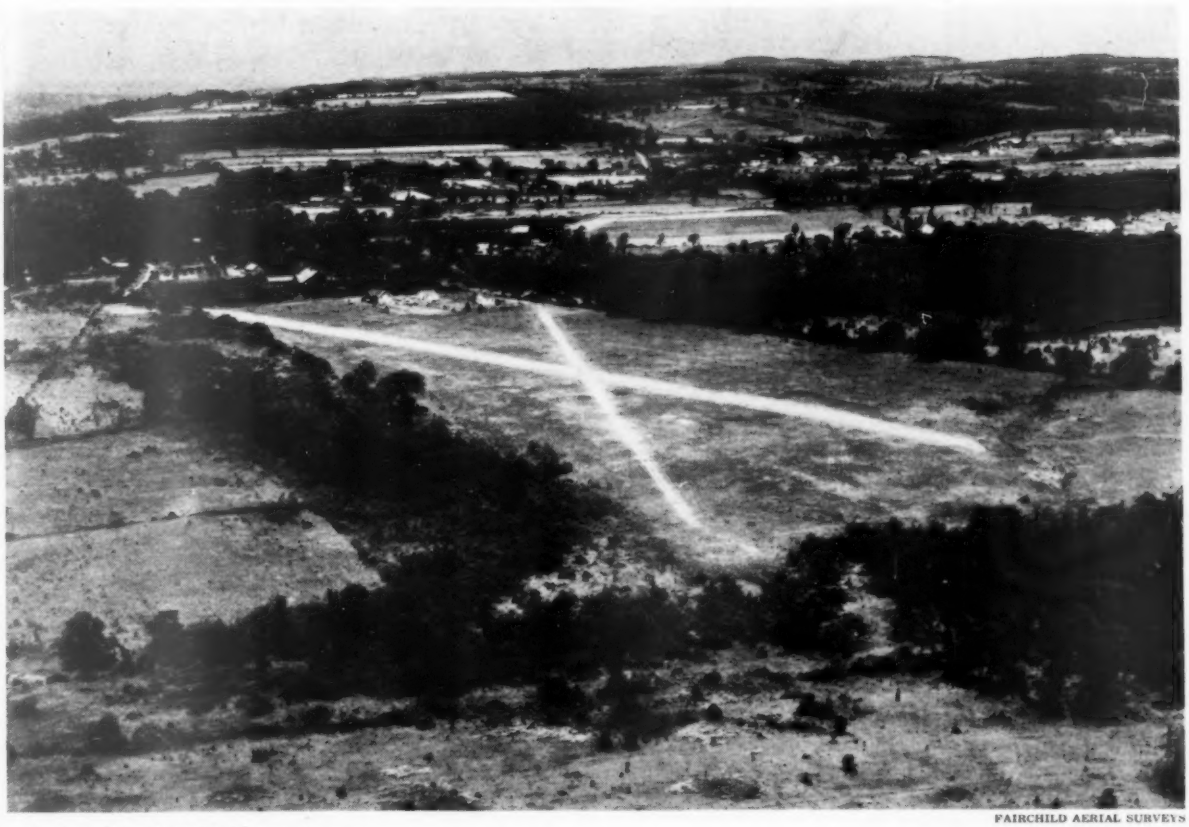
Manifestly the number of such d... that may be used about any area i... limited, nor is the number of bombs c... by any of the wires, and as obvious... balloon holding wires may be attac... a battleship or small boats near th... the locations being so chosen that it ... the impossible that any aircraf... striking one or mor... be n

Issued in 1913, the above patent covered an antiaircraft device now being considered.


THE GRAPNEL AND EXPLOSIVE CHARGE
GRAPNEL
DETONATOR HORNS
DISCONNECTING PLUNGER TO RENDER EXPLOSIVE INERT
LINK ATTACHMENT TO WINCH
WEAK PIN
LINK PULLED INTO PICK-UP RING
PARACHUTE PICK-UP RING
THE LINK ATTACHMENT TO WINCH, SHOWING WEAK PIN
WINCH WITH WIRE UNWOUND AND PARACHUTE CONTAINER
PARACHUTE CONTAINER
PARACHUTE PICK-UP WIRE
FABRIC RETAINING PATCHES DOPED OVER PICK-UP RING AND PARACHUTE CONTAINER ORIFICE
UNDERSIDE VIEW OF PICK-UP RING AND CABLE TO PARACHUTE

This Steinmetz device, 28 years old, is a prospective new British development.

# Sixteen Dollar Airport



FAIRCHILD AERIAL SURVEYS

Airview of Loucks Field showing the new runways and excellent landing approaches.

by DONN HALE MUNSON

*When 38 air-minded people band together to solve a problem, there's sure to be action. Especially when a friendly farmer is nearby.*

AN airport for $16! WPA administrators, professional engineers and anyone who has ever tried to build a flying field will howl and say it can't be done. But ask any member of the Schenectady, N. Y., Gliding and Soaring Association and he'll tell you different. Because that group did it. Located in the center of fine soaring country, gliding was non-existant there until last year. Almost four months to the day after the aviation editor of a Schenectady paper wondered aloud in his column why nobody took to motorless flight, a healthy young club was in operation. Here's how:

Answering the journalistic call for gliding enthusiasts, scores turned out for a public meeting. Sure, there were glider enthusiasts in the area. As a matter of fact, ten or more years ago a club had existed, but broke up when a student pilot suffered a heart attack while soaring, causing the ship to spin in.

Thirty-eight potential members of the silent clan joined together and formed the organization they now call the Schenectady Gliding and Soaring Association, although the unit is better known as simply "The Glider Club." Malcolm Wilson, manager of the Schenectady Chamber of Commerce and former resident of Elmira who was instrumental in promoting soaring at Harris Hill, turned over the chamber's meeting rooms to the flyers. A long series of meetings were held throughout the winter months. But little or no progress was made immediately. There was considerable haggling over the club's operation. Two camps sprang up over the issue of what the aim of the organization was to be. One side maintained that the group should be select, paid for by its members and operated as a semi-social outfit while the second clique demanded an association, open to all and to be run informally, taking as little actual cash from its members as possible.

The latter side more or less won out, adopted a few of the other's policies and soon the club was given unity. Officers were elected and a program set up.

Of great aid in sponsoring the club was Aubrey Coyle, 22-year-old protege of Dr. Irving Langmuir, winner of a Nobel Prize for chemistry and an ardent glider enthusiast. With Dr. Langmuir, Coyle, who held a private power-plane rating when 17, had attended a number of national soaring meets at Elmira. Together, the youngster and famous scientist had taken "C" ratings on motorless ships there. Coyle consented to act without pay as club instructor and Dr. Langmuir was named honorary president.

After the problems of organization were licked, the club turned to its treasury and idealistically hoped to raise sufficient funds to purchase a ship through popular subscription. After much difficulty and effort, the club abandoned the idea and appealed to its members. A

set up of "associate" and active memberships was drawn up. Associate members today take an active part in club affairs, serve on committees and as officers yet do no flying. Active, or flying, members paid $20 each toward raising funds for the ship purchased in May.

No specific ruling was set up as to how the money could be raised. Either a member could contribute from his own purse or work for the money by selling associate membership. To merchants, professional men, to police officers, firemen and ditch-diggers went memberships at $1 each. Each associate member was given all privileges of the organization except to fly the glider.

Naturally, many of these memberships were pure charity, given by persons interested in aviation and in youth movements. The club has approximately 100 such cards out at this writing. Active members total 14, three of which hold private glider pilots' rating, one an instructor's rating and the rest student permits. Numbered among the associate members, too, are many student pilots who look forward to the day they can afford to be active members.

When the membership, through scores of methods such as raffles, entertainments and odd jobs, had raised $400, the club looked around for a ship. The members would tolerate no primary trainers. It would be a secondary type or none, they decided. In Elmira they located the ship they wanted. A committee, headed by Club President Abram Fuller, journeyed to the famous soaring site, looked over the ship and came home after having put down a payment.

While efforts were being made to pay off the balance and while associate and active members alike strained to make good their slogan of "A Ship in the Air by June," a special committee went to work on the problem of getting a field.

The county airport was out, it was learned in short order. Already there had sprung up the old battle between power and glider pilots which no one seems to understand but which springs up wherever a glider club exists. Airport managers politely explained that gliders, the ropes and gear which went with them would be in the way of commercial ships and student training. So the club cast about for a field.

Meantime, weekly and sometimes semi-weekly the club went to school. Instructor Coyle and Dr. Langmuir taught ground school to both active and associate members. Courses in meteorology, theory of flight, history of aviation and other allied subjects were taught. Before the Franklin utility glider purchased in Elmira arrived in Schenectady, every member was soundly drilled in those courses.

The field committee, headed by Dick Dalton, found what they considered an adequate field for training. Located but two miles from the center of Schenectady and within an eighth of a mile from Dalton's farmhouse home, it was ideally situated. But how to gain possession of it? The club was, frankly, broke. Buying the ship had taken its last nickel.

(*Continued on page* 76)

AIRCRAFT OWNERS AND PILOTS ASSOCIATION

# AOPA NEWS

IN the past little mention has been given to local AOPA units in these columns. Their accomplishments now make it advisable that we print the story for your review. Keep in mind that these AOPA units have been organized on a strictly voluntary basis and that most of the organizational work was accomplished by local airmen who wanted their airport area to have a better reputation in the aviation industry.

Less than two years ago there wasn't one strong AOPA unit in existence. Today there are over 100. Des Moines, Ia. is the home of one of the busiest units. It was founded by Dr. Stewart M. Sawdey, No. 1485. The present officers are C. Edwin Helm, president; John Paul Jones, vice-president; D. Warren Jewett, secretary and Wendell M. Willett, treasurer. After last year's successful lightplane show this year's big professional air meet—known as the Mid-West Air Olympics—was a great financial boon to the treasury of the AOPA *Des Moines Unit*. They are already under way with an excellent air marking campaign for all cities surrounding Des Moines. The officers of this unit also led the opposition which defeated a bill before the Iowa state legislature to impose aviation gas tax and other taxes on the private flyers. L. T. Johnston arranged many breakfast flights for the unit and they now have approximately 10 flights to their credit.

## On the West Coast

On the west coast the AOPA Metropolitan Oakland unit was founded by C. R. Tinsley and at present is headed by Bill Hanley, president; Charles Beatie, flight chairman; Ralph Busby, vice-president and Ed Landell, secretary-treasurer. Undoubtedly the biggest thing they have done for flying in the San Francisco metropolitan area is to organize series of breakfast flights. They have flown en masse to Sacramento as guests of the Sacramento Flyers, Inc., and as this is being written they expect the largest turnout of light airplanes ever to assemble at the famous Lodi, California, Grape Festival. Because the pilots of this metropolitan area organized themselves without remuneration of any kind, they were able, with the assistance of the national office, to obtain the lowering of the high tension lines at the Martinez Airport. (Again AOPA congratulates the Shell Oil Co. of San Francisco for the fine support they gave this unit in that project.)

In Seattle, Washington in March of 1940, correspondence was started with Joe Benezra, a member of the Washington Escadrille, Inc., who was acting as secretary pro tem for the organizational

Marion L. Schooley (r) registers Chas. Leslie Long at Du Quoin, Ill. Welcome pilot Long!

work of the AOPA *Seattle Unit*. Others who were assisting him were Clyde L. Wren, secretary of the Washington Escadrille; Marion Galvin of the Galvin Flying Service in Seattle and John G. Evans of Northwest Flyers, Inc.; Dr. H. L. Hartley, who now is president of this strong AOPA Seattle unit; and Arthur B. MacWhinnie. Through Dr. Hartley and the other officers of the unit, many very interesting programs have been arranged. In December, 1940, a special meeting was called for a new airport program for the Seattle area. At this meeting Verne Hyde, who was testing the new Boeings at that time gave an interesting lecture on the bombers. Proper insurance coverages were discussed by L. R. Fedham of Seattle and then the

(*Continued on page* 110)

★★★ ★★★

# "KEEP'EM ALL FLYING!"

★★★ ★★★

Army recently adopted slogan "Keep 'Em Flying." Above, AOPA's version of same.

# He Takes Flying Seriously

By

WARD HILL

**Robert Taylor may be The Great Lover to some people but, to himself, he's just a guy who loves to fly. Only work keeps him grounded.**

COMES the summer and there is bound to be a greater feminine interest in flying. Particularly in Southern California. Gals who at this minute don't know dihedral from angle of incidence, who never wore coveralls and think airplanes are something a nice girl shouldn't monkey with, will be busy at airports putting in and taking out cotter pins, tightening propeller blades and loosening empennages.

That's a startling prediction until you hear the news. Spangler Arlington Brugh —that's the name that will show on his private license—has taken up flying, has 10 hours of solo, owns his own plane and is apt to drop in anywhere at any minute for a coke and a sandwich.

So it still doesn't mean anything to you?

Well, let's get it over with. Robert Taylor is flying. Yes, the screen star, the lad who has sent millions of hearts skipping beats like broken tachometers. The lad who recently made "Flight Command," before that a score of pictures including "A Yank at Oxford," "Escape," and "Waterloo Bridge."

Yes, Bob's flying. Not because he wants publicity. Not because he wants to look like a hero and not because he wants to take bows. Simply because he has always wanted to fly and, like so many other Hollywoodians who have recently gotten to the place where they can afford it, he's realizing a life-long ambition. As a boy—and until only a couple of years back—owning an airplane was, for him, impossible.

Perhaps, to some of us, he's put the cart before the horse. But what he's done merely gives proof to the fact that he means what he says when he tells you:

"I take my flying seriously."

For Bob, before he had ever handled the controls of a plane, went out and bought one. He tested out a ship which was a little less expensive than the one he bought, decided after a half-hour's flying that it didn't have enough power for him. Then, one day at lunch time, he rushed over to Culver City Airport, climbed into a Fairchild with Norman Larson, salesman, and Max Constant, instructor and flew for 20 minutes.

The next day he called Larson and said:

"I'll take that one."

The ship, a yellow and black job with a hand-rubbed finish, was delivered to him. Before many days had passed, he had added two-way radio and all instruments necessary to instrument flight. And he was off to learn to fly. He retained Max Constant, technical adviser to Jacqueline Cochran, instructor and speed pilot, to teach him to fly. He soloed in 15 hours and 30 minutes.

"Not too good," he says, smiling. "I'm no fireball."

The truth of the matter is that he required about 10 hours. Having a plane, he wanted to go places. Take-offs and landings got tiresome. His logbook shows two supervised flights to Palm Springs and return, which means that you can charge off just about five hours.

Bob got the idea of becoming a pilot, at last, while he was making "Flight Command." This incidentally, is the way that many motion picture actors finally conclude that they ought to be in the air. Wally Beery did that. He talked to Frank Clarke, the veteran Hollywood stunt pilot who was working on a film with him, back in 1925. This same Frank Clarke was on the sets of "Flight Command."

Bob talked to him. He talked to three Navy pilots. He sent for and talked to amiable Eddie Bellande, who flies the Albuquerque-Burbank run on TWA. They all stood around like kids at the edge of a swimming pool who, having been ducked, urged their pal to jump in.

Bob jumped. He took delivery on the sleek Fairchild in October. That was after "Flight Command" had finished, he'd flown to glory with the Navy, had fallen in love with Ruth Hussey, had developed a new landing beam and had performed other cinematic duty.

"Let's go to Palm Springs," he suggested to Max. They climbed into the four-place job, high-tailed down there. Bob handled the controls for the first time. They landed.

"I didn't know what it was all about," Bob said. "I was sure I'd never learn."

He and Max practically wore out the airport. Every time he'd want to fly away somewhere, Max would put his foot down.

"You've got to learn to land it, Bob," Max would say.

Hours drifted by and, finally, three weeks after they arrived, Max put him through his spins. He got away from the plane, looked back over his shoulder and said:

"Fly it!"

Bob did. He made two landings.

"I can't tell you the thrill and the awe I felt," he told me when I dropped in to see him as he worked with Brian Donlevy at M-G-M making "Billy the Kid."

"I was thrilled to be up there, to find that I was really flying. I was awed when I discovered that I was actually flying the job, all by myself—something I thought I'd never learn."

Bob hasn't had much solo time, since. In the first place, "Billy the Kid" started and he worked on the picture for 10 weeks with no chance to get out to Metropolitan Airport in Van Nuys, where he stores the ship with Dick Arlen and Dick Probert (*see* FLYING AND POPULAR AVIATION, May, 1941). Besides, California weather has been going haywire, a high fog having delivered about 10 inches of rain in the month of February.

"I did fly the ship up to Tucson to start the picture," he says. "It was a great flight. I got along swell. I rode the beam, read the map, kept the wings level and did a beautiful job—until I landed. Then I did one of the prettiest ground-loops

(*Continued on page* 95)

Taylor went for a flight one day and bought this elaborately-equipped Fairchild the next. Max Constant taught him to fly it, finally letting him solo after 15½ hours.

## Flying Churchman

FUTURE use of airplanes in worldwide church work is predicted by the Rev. Dr. Samuel Trexler, president of New York's United Lutheran Synod. Dr. Trexler is making a South American missionary tour this summer mainly by air. He believes air travel will enable him to cover a vast territory in a short time, as well as bringing church practice into line with twentieth century efficiency.

"From the viewpoint of the United States," he declares, "South America is the land of the future in trade and cultural relations; it is fitting that the church also should see her opportunity in this land of the future and should make use of that future method of travel, the airplane. Today the church equips automobiles as itinerant chapels; tomorrow she will do the same with airplanes, manned by her own pastor-pilots. Our spheres of Christian influence will grow wider and we shall have to maintain contact with churches and missions by the best and swiftest transport known. Incidentally, we may be able to show that one of the most splendid inventions of man can be used for spreading Christian good news instead of destruction.

"In foreign mission work air travel may become a virtual necessity. Japan will not be the only nation to insist that Christian churches must be run by nationals of the countries where they are located. If the time should come when no American pastor were allowed to minister permanently in any land other than his own he could still establish contact in foreign lands by long visitations, which more and more would be made by air.

"My South American air tour is merely a beginning. It will not be made entirely by air, as I am going by sea from New York to Santiago, Chile, by way of the Panama Canal and the west coast of South America. From Santiago I fly over the Andes to Buenos Aires, center of Argentine work; then on to Rio de Janeiro, Brazil, and Georgetown, British Guiana.

"If men do not become Christian the only planes we shall know in the future will be bombers. We shall degrade this glorious invention by devoting it to destruction. It becomes a Christian duty for the Church to show that the airplane can be a vehicle for spreading the constructive forces of mankind, for building up man's cultural life, not tearing it down. The goodwill clipper trip of the Rev. Dr. John Sutherland Bonnell, pastor of the Fifth Avenue Presbyterian Church in New York, to war-torn Britain is a fine example of the constructive use to which aircraft can be put."

## Checking Drag

WHEN RAF flight experts wanted to know how much drag was created by protruding rivets on one of their fast planes, they pasted half-sections of dried peas over the ship's thousands of flush-driven rivets. Speed differences before and after were presumed to indicate the resulting "drag."

# I LEARNED ABOUT FLYING FROM THAT!—NO. 30

### by JAMES L. H. PECK

*Loose dirt in cockpits is dangerous. The author learned this flying a plane in the Spanish war.*

THAT august gentleman who once said something about a grain of sand shaping the affairs of man really had something. This particular morning, four years ago, a few grains of sand certainly put my affairs in extremely bad shape and gave me the most tearful—literally—15 minutes of my then 24 years.

Prior to our assignment to combat duty, we were given some refresher time and combat training at the naval air base at La Ribera on Spain's southern coast near Cartagena. Three of us took off in Renault-powered Caudron *Aiglon* trainers for formation and aerobatics practice shortly after sunrise into a mild southeasterly wind and climbed out to sea. Paul Williams, Youngstown's gift to aviation, was flying opposite me in No. 3 position, Alberto Aybar, formerly a captain in both the Dominican and Cuban Air Forces, was leading, and I was flying No. 2 station. In the front seat of the Caudron one sits fairly low and the windshield supplies plenty of protection; none of us had his goggles down.

James Lincoln Holt Peck, at 29, has a career behind him that would be the envy of any adventure-loving man. As a Loyalist pilot in the Spanish Civil War he flew fighters—mostly Russian—and is credited with shooting down four Italians and one German. His father was a Government clerk who saw to it that his son got a liberal education. He attended the University of Pittsburgh. He recently turned down an offer to fly bombers to England at the plea of his six-month bride.

A prolific writer, Peck has written many authoritative articles for this magazine as well as Harper's and the Scientific American, and is the author of two successful books. He is an honorary member of the Eugene Field Society.

The accompanying article is one of many he has written about his experiences in the Spanish Civil War. He is considered an expert on the subject of modern military aviation.—Ed.

For about half an hour we practiced pattern maneuvering, exchanging positions frequently. During the course of a series of very steep turns, during which my ship was either on high side or the bottom of the V, I felt what I thought was dust blow against my neck and cheek but thought nothing of it at the time. Besides, I was much too busy trying to guide on Alberto's plane, formation work being rather new to me.

We split up and climbed higher and farther out to sea for individual aerobatics. There was a regular routine for practice of the maneuvers. I wheeled the Caudron through several reversements, wing-overs, and split S's. Then a couple of left and right snap rolls. The ship stunted well, but seemed to have a tendency toward vibration in the rolls. I gave her some more throttle and tipped over into what I intended as a slow roll. It was not completed.

The ship was not quite over on its back when I felt some more of the dust on my neck and face. Just as I took my hand off the throttle to put my goggles where they should have been, a cloud of the stuff sifted into my mouth, nose, and eyes as if someone had gently thrown a handful.

My eyes felt as if red-hot coals were under the lids. The dust in my nose kept me sneezing. I could tell that the plane was still more or less on its back because I was firm against the belt and my feet wanted to fall off the rudder pedals. The Caudron had too high a wing-loading to remain inverted with such indefinite control action as took place just then. It fell off into a spin.

I could tell it was spinning, but I wasn't certain which way. Painful, unseeing eyes are not conducive to cool, logical thinking either. They were filling up with tears by the time I sticked forward and set my feet in the rudder pedals properly.

The plywood wing began to sing shortly after I applied left rudder. Still felt like a spin. I kicked right rudder, kept the stick forward, or what felt like forward. The sound and increasing rush of air seemed to indicate a steep dive. I wasn't certain whether the spinning had been stopped, but I eased the stick back.

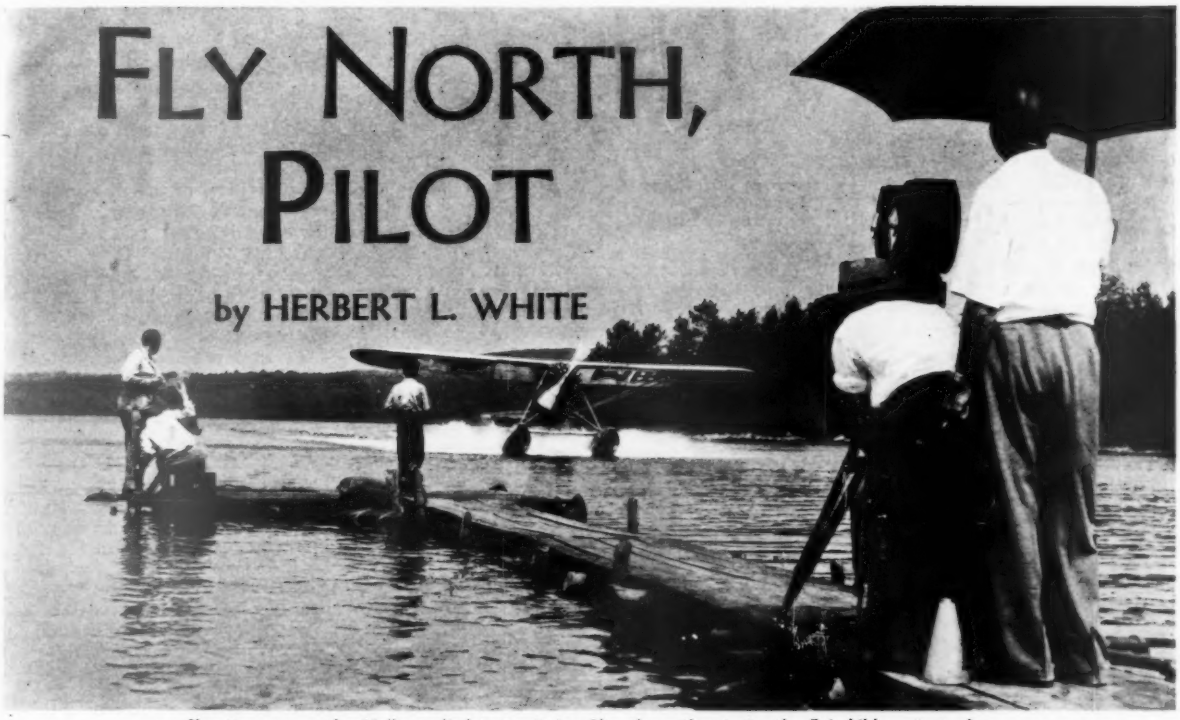
I sunk down in the seat. The Caudron is a very clean ship and the spin and dive must have been definitely on the fast side. Because I was rared back against the headrest I figured the plane was zooming up rather steeply, but I held the stick back. As I later figured, I was tense and had not pulled it straight back, for the ship seemed to slow up then I was thrown on the belt again. She spun once more.

The right eye opened up a bit, but everything seemed red and blurred. I could make out my hand on the stick but couldn't see my feet; could only feel them on the pedals. Through another interval of painful trial and error, I stopped the spin and, watching my hand carefully, brought the stick back straight. Through the windshield I could make out a dark

(*Continued on page 84*)

# FLY NORTH, PILOT

by HERBERT L. WHITE



Shooting a scene for Hollywood's latest aviation film, the author taxies the Fairchild up to a pier.

*To the imaginative private pilot, Canada offers vast and untouched sport. The author recommends a seaplane, though.*

Flying for the movies has been a profitable White sideline for seven years; he has flown for about 35 films to date. Primarily, he is a successful business man, heading the California Aircraft Corporation which distributes lightplanes on the west coast. Although he usually is associated with big, fast aircraft, Herb White believes the lightplane is the backbone of civil aviation today. Born in Omaha, Neb., 47 years ago, he learned to fly in 1922 and has been at it ever since. He wrote "I Learned About Flying from That!" in our May, 1941, issue.—Ed.

THE movies have just discovered Canada. And so has White. To a fellow who has spent most of his life flying around the southwestern section of the United States, the country is a revelation. I flew up there on business, that of making a film about the famous "bush flyers," or lads who'll fly anywhere any time for freight, passengers and what-have-you. The next time I go it'll be on pleasure and I'll have a seaplane—that is, a pontoon job—tucked away in my vest pocket. The country is a paradise for anybody who can get hold of floats.

In the first place, flying floats isn't as tough as the hangar flyers would have you think it is. Five of us, all stunt flyers making our headquarters in Hollywood, headed into Canada. Frank Clarke drew the assignment of chief pilot. He also flew the camera ship, a tri-motored Stinson. Howard Batt drew a Noorduyn *Norseman*, Jerry Phillips was given a '34 standard Waco, Garland Lincoln took over a '36 deluxe Waco and I was presented with a Fairchild "71." All were on floats, because there are more lakes underneath you than there is land.

We were a part of a troupe of 150 motion picture players and technicians. In the crowd were Jimmy Cagney, Brenda Marshall, Dennis Morgan, Alan Hale and George Tobias. Michael Curtiz directed. The film, at this writing, is titled "The Captain of the Clouds"—but you never can tell if those things are going to stick.

I can't speak officially for the rest of the boys, but I don't think they'll mind if I say that they haven't had much seaplane time. Personally, with more than 3,000 hours logged, I had never flown off the water until I went down to Wilmington, Cal., with the rest of the pilots and checked out in a *Cub* trainer on floats with Kenneth Baetz. Yes, I said *Cub* on floats. The next time I got into a float

White poses on a Noorduyn "Norseman."

job it was to haul the Fairchild "71" into the air. I was about 3,000 miles from there and on fresh water.

I checked out in 50 minutes and the other boys averaged about that. A CAA inspector gave us flight tests and our ratings and we were off for Canada, part of the largest motion picture company which has ever invaded the country.

The trip was to last from July 15 until August 18. Our first stop was at Ottawa, Ont., where we were given the cooperation of the Uplands Air Base for scenes showing the "bush flyers" strafing the RCAF boys to show them that they knew how to fly and to try to get into the service. Why did we do the flying instead of the "bush flyers?" Simply because the whole gang of us is camerawise and we

(*Continued on page 74*)

# PILOT PLANT

by

R. T. FRENG

R. T. Freng

*With the Army and Navy keeping all its pilots, the airlines have been faced with a shortage. United Air Lines, however, devised this solution.*

JUST a year ago, United Air Lines established a pilot training school at Tracy, Cal., the only institution of its kind in the world. No sooner was the move announced than we began to receive a considerable volume of comments, advice and speculative remarks.

In establishing the Tracy School, we sought a solution to the problem of obtaining skilled flight personnel to carry on air commerce in the face of increasing demands being made on air transportation by the national defense emergency and also in the light of a diminishing supply of prospective airline pilots from the military services. On the one hand, we had an insistent call for more and more service to provide an air speed so vital to the whole defense program. On the other, we had a drying up of our sources of flight personnel.

Speculation as to how well this new system of pilot training might work was natural enough. In spite of all our studies and consideration before launching the project, we ourselves could not be too sure.

More than three months have elapsed since we graduated our first class of 19 men from the Tracy school. In that period, these men have been flying every section of our system as first officers. What sort of a job are they doing? How are they measuring up to the high standards which we long ago established for first officer material?

Today those questions can be answered. Reports submitted by United's captains and flight superintendents show that these Tracy graduates are giving an excellent account of themselves and that they have justified our efforts and expenditure in every way. They have demonstrated to our satisfaction their ability and proficiency in the daily routine of handling aircraft and in all the other duties of a first officer with the result that all our captains have endorsed the method followed in their selection and training. We feel confident that controlled, supervised training in the early stages is equally if not more important than a large number of miscellaneous flying hours with little or no supervision.

The whole subject of the Tracy school and the methods followed there should be of prime interest to the aviation world because of the many new factors involved. For one thing, our move was the first to be taken by any airline toward the controlled and supervised training of future pilots by veterans of the business.

Our first classes were made up of men who had had two or more years of college training and who had passed both the primary and secondary phases of the Civilian Pilot Training Program. They had an average of around 90 flying hours to their credit when they entered our school. There they began an intensive program of study and training. Aerial navigation, instrument flying, aero-dynamics, meteorology, the principles of engine construction, craftsmanship, radio and radio ranges—such were just a few of the subjects which they tackled.

After five months at Tracy and another month of transition work at the Boeing School of Aeronautics at Oakland, those men emerged from the process as airline first officers, ready to begin service immediately. Upon graduation, they had an average of about 250 flying hours each.

The development of those men from somewhat inexperienced private pilots to first-class airline flight personnel represented, in our opinion, a definite achievement and one of significance in showing what could be accomplished through a new, scientific approach to the pilot-training problem.

Today, approximately 50 graduates from the Tracy school are flying our airline as first officers. Another 30 will complete their training within the next two months. That will wind up the first five classes which we enrolled beginning last fall.

Starting in November, we plan to enroll another 100 students—and that action alone might be the best testimony of our satisfaction with the Tracy project. Like their predecessors, these new enrollees will be carefully hand-picked from the ranks of college and university students throughout the country. Also like their predecessors, they will have to pass thorough physical and mental examinations before they can be accepted.

As the Civilian Pilot Training Program has progressed and as more material has become available, we have raised our requirements so that we now insist on completion of all phases of the CPTP schedule—including cross-country and review courses—as well as two or more years of college experience for Tracy pilot-training applicants. Thus, new enrollees will have had about 160 hours of flying experience when they enter our school.

While we sought only CPTP pilots for our first five classes at the school, our new classes will be opened to all pilots, commercial, military or itinerant, who can meet the requirements. In other words, there will be no discrimination made between CPTP pilots and those who have trained elsewhere and who can qualify.

Company officials now are visiting college and university campuses in personally interviewing groups of CPTP students. The scholastic and flying records of all likely candidates are carefully checked. Certifications of CPTP training, as well as transcripts of scholastic work, are required. If these prove satisfactory, the candidates are called to our general headquarters at Chicago for intelligence and temperament tests as well as physical examinations. If they pass these, they will be enrolled for the Tracy course.

It sounds like we are extremely particular—and we are. If all we wanted were men who could fly planes, we could find literally thousands who would serve our purpose. Airline captains and first officers have to be Grade A flyers, of course. But they also have to be engineers, keen executives worthy of the responsibility they command and the type of men who can grow with what perhaps is the fastest developing industry in the world today. Careful selection is the answer.

Now, assuming that we have our candidates ready for enrollment, let us see

Born in Norway in 1900, Ragnar T. Freng came to the United States after learning to fly in Europe and barnstorming throughout that continent. Today, as director of flying for United Air Lines, Mr. Freng can look back on 12,000 hours of flying with the U. S. Army Air Corps (1919-1921), the U. S. Forest Fire Patrol in the Pacific Northwest (1925) and the air mail service in Georgia and Florida in the latter year. He began flying for predecessor divisions of United in 1927, becoming head of that company's pilot staff in 1937. One of the country's most scientific airmen, Mr. Freng is said to have made more instrument landings than any other pilot in the world. He is married and lives in Oak Park, Ill.—Ed.

This is a recent Tracy graduating class. Graduates are receiving their wings from Maj. Lloyd B. Jones, air officer of the Army's Ninth Corps Area. At this stage in his career, each man has 250 flying hours.

This Tracy student, Vernon Storla, is about to take off for some advanced flight instruction in a school Howard monoplane.

School graduates are carefully checked by United veteran flyers. Below, Capt. Jack Knight in cockpit with Pilot D. R. Suchner.

The importance of the airline plan is explained to two Tracy pupils. There are 10 airplanes and 15 flight and four ground instructors at the California school.

what kind of a life they face at this novel institution of ours. Students are quartered at Tracy Inn, a neat hotel in the town of Tracy (population 5,500) 50 miles east of Oakland, Cal. Flight activities are carried on at Tracy airport, 2½ miles from town; ground school training is given in a special schoolhouse in town.

There are 15 flight instructors and four ground instructors, along with 15 or 20 radio operators, maintenance men, watchmen and others, on the school staff. Directly in charge is George Myers, million-mile veteran of the air mail service and, for the past several years, chief of flight instruction at the Boeing School of Aeronautics. In charge of flight instruction is George Willingham, whose record also dates back to the early air mail days. The four ground instructors are experts in their fields which include meteorology, aerodynamics, engines, accessories, radio, regulations, maintenance, air transport operations, etc.

Ten planes—Boeing "203s," Howards, Fairchilds and Stinsons—make up the school fleet. Training on multi-engined transports is given at Oakland.

The Tracy day starts with breakfast at 6:30 and the opening of classes at 7:30. The hours until 4:30, with the exception of time out for lunch, are divided up between actual flying, both visual and instrument, and ground courses. After 4:30, the student is on his own until supper at 6 p.m. Everyone not taking night instruction must be in his room by 9:30 and lights go out at 10. All in all, it's a simple, clean and strenuous life.

Ground school courses can be divided roughly into six classifications: instruments, aerial navigation, engine construction, aerodynamics, study of Civil Aeronautics Board regulations and meteorology. During ground instruction, the student spends a part of almost each day in the air, perfecting in practice the knowledge which he picks up in the classroom. He also puts in several hours a week in the Link trainer, working out flight procedures under "actual" flying conditions entirely by instrument.

The first three weeks of flying are given over to familiarization work. After that comes more difficult aerial navigation. Toward the need of his training, the student makes cross-country flights of several hundred miles. Altogether, he gets in about 115 flying hours at Tracy before taking CAB tests for commercial and instrument ratings. He then goes on to the Boeing school for further advanced instruction and for detailed flights in twin-engined transports.

It isn't "all work and no play" at the school. No classes are held on Saturdays and Sundays, giving the students plenty of time for fun and rest. A recreational room, equipped with pingpong tables and various exercising devices, is maintained at the Tracy Inn. Also, through arrangements with the Tracy high school, students have access to the school gymnasium. Basketball, baseball and handball teams have been organized by the students and are competing with other teams in the San Joaquin Valley leagues. The students also go in for horseback riding, hiking, tennis and golf.

Close tab is kept on the student from the time he enters Tracy until he completes his advanced work at Oakland. Complete records are maintained on his progress aloft and on the ground. Instructors also observe his manner and his temperamental approach to problems. If either his actual progress or his manner of assimilating the work falls short of the standard set he is dropped from the school. Due to the careful method of selection in obtaining students for the

(*Continued on page* 114)

## Jenny Instruction

THE following instructions on "How to Fly a Jenny" were picked up recently by a North American Aviation representative at Wright Field:

1. Inspection: It is best not to inspect this ship. If you do, you'll never get in it.

2. Climbing in the cockpit: Do not attempt to enter the cockpit in the usual way. If you put your weight on the lower wing panel it will fall off. And besides, your foot will go through the wing, probably breaking your leg. The best way to enter the cockpit is to climb over the tail surfaces and crawl up the turtle back. Be sure to brush the gopher and squirrel nests out of the cockpit. Try not to cut your hands on the broken windshield.

3. Instruments: After having carefully lowered yourself into the cockpit and groped in vain for the safety belt, take a good look at your instruments—both of them. The one on the right is a tachometer. It doesn't work. The other one it an altimeter. It functioned perfectly until 1918, when the hands came off. Look at them now, for when the engine starts you won't be able to see them.

4. Starting the motor: The switch is on the right. It doesn't work, for it isn't connected. However, it gives a sense of confidence to the mechanic who is pulling the prop through, as he can hear the switch click when you say "switch off." If, for some reason, the motor doesn't start, don't get out to pick up the cut and bleeding mechanic. He deserves it.

5. Warming up: Don't warm up the engine. It will run only a few minutes anyway and the longer it runs on the ground the less flying time you have. After the throttle is opened, do not expose any portion of your body outside the cowling. It is no fun having your face slapped by a flying rocker arm, or to be peppered with small bits of piston rings, valves, etc., that are continually coming out of the exhaust stacks.

6. The take-off: The take-off is in direct defiance of all the laws of nature. If you have a passenger, don't try it.

7. The flight: After you have dodged trees, windmills and chimneys until you are over the lake, you will see a large hole in the left side of the fuselage. This hole is to allow the stick to be moved far enough to make a left turn. Don't try one to the right.

8. The landing: The landing is made in accordance with the laws of gravity. If the landing gear doesn't collapse on the first bounce, don't worry—it will on the second. After you have extracted yourself from the wreckage and helped the spectators put out the fire, light a cigarette and, with a nonchalant shrug, walk (don't run) disdainfully away.

## Awesome Words

"THIS business has become bigger than my wildest imagination, or even the dreams of others of us in the pioneer days of aviation," remarked Orville Wright, co-inventor of the airplane, at the dedication of the new Wright Aeronautical Corp. engine plant in Cincinnati, O.

Each week Air Cadets receive one hour's technical instruction at Brebeuf College, Montreal.

Military drill is an important phase of the cadet's training. Above RCAF officers inspect line of youths on parade ground during drill at Brebeuf.

# Junior Air Force

## by JAMES MONTAGNES

*The Canadian Government has organized the junior RCAF, known as the Air Cadets League. Youths are taught the fundamentals of army life and flying.*

TOO young to join the Royal Canadian Air Force, thousands of Canadian boys 12 to 18 years old now feel that they are playing an important role in Canada's war effort by preparing for the day when they, too, can don the blue uniforms worn by airmen throughout the British Empire. After long agitation by Canada's youngsters and air-minded youth leaders, Canada's government has now sponsored the Air Cadets League of Canada, a junior air force in training, modelled on a similar organization in Great Britain which by latest reports has some 500,000 boys enrolled.

The Canadian Air Cadets were started officially late this spring, with Canada's governor-general, the Earl of Athlone, as patron. A first World War air hero, Air Marshal "Billy" Bishop, VC, was made honorary president. Another first World War flyer, George B. Foster, DFC, of Montreal, is Air Cadets' president.

The Air Cadets' uniform is similar to that of the Royal Canadian Air Force. They have a distinguishing collar badge and emblem, the air force albatross with maple leaf above and "Air Cadets Canada" below. Where their big brothers wear the albatross of leading aircraftsmen rank, the juniors wear the name of their squadron. Like the air force, the boys have military drill and uniform inspection. They can earn stripes, with Warrant Officer Class I as highest cadet rank. Officers commanding squadrons generally are former first World War flyers with rank of squadron leader.

Before the Air Cadets' formation a number of local organizations had been

(*Continued on page* 112)

Training requires neatness and discipline. Cadets must ready themselves each morning for inspection and buttons must sparkle.

Cadets attend some classes in real airplanes. RCAF officer in cockpit of this Noorduyn "Norseman" shows controls to cadet.

# SCHOOL For

These fifth-term students learn about flying boats while dismantling the metal hull of an obsolete ship.

NEW YORK CITY'S Board of Education has a national defense production line of its own. The raw material enters through one door, is inspected and passed on to a wood shop. From there it travels to a metal shop and moves on down the line through all aircraft production phases. Three years later it emerges through the front door, a finished aircraft mechanic.

Largest public aviation school in the United States, the Manhattan High School of Aviation Trades is preparing 3,000 young men for mechanical jobs in America's ballooning aviation industry. Installed in two ancient buildings in New York's heart is $1,000,000 worth of modern machines, aircraft engines, airplanes and other equipment—partly loaned by the armed services—which are running full time to yield up their secrets to earnest boys.

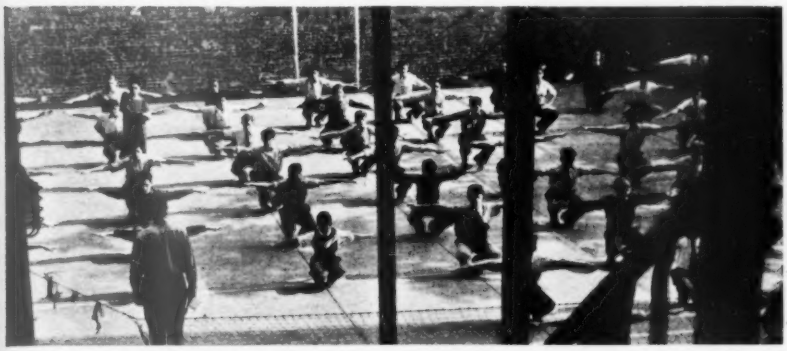
It's a unique school, one whose importance has soared since the national emergency's beginning. Twenty-four shops and 34 classrooms are filled to capacity from 8 a.m. to 5 p.m. More teachers and instructors are qualified for their jobs through trade experience than college degrees; they average 12 years in the aviation industry. Of the 54 shop teachers, only five are college graduates. But that is not important when you consider that two-thirds of them hold one kind of technical license or another.

S.A.T. graduates are scattered throughout the country in all types of aviation plants and in the airlines. Placement consistently runs above 90 per cent and those of whom school authorities have no records may well be employed in jobs for which their schooling trained them. So diverse is S.A.T. instruction that former students have been able to get jobs with such different organizations as Brewster Aeronautical Corp., Edo Aircraft Corp., the U. S. Army Air Corps, Sperry Gyroscope Corp., Pan American Airways,

# DEFENSE

## by E. JAY DOHERTY

*Manhattan's High School of Aviation Trades is a national defense project all by itself. It currently is training 3,000 plane workers.*



It's not all working with machines. S.A.T. students have regular daily periods for physical exercise and outdoor games. It takes three years to complete aviation course.

Students get practical experience in aircraft rigging. Planes used in the school are obsolete service types, donated by Army and Navy. Ship below is a Navy Vought.

Erickson and Remmert, Inc., Flushing Airport, Wright Aeronautical Corp., American Airlines, Grumman Aircraft Engineering Corp. and many others.

The course laid out for the students is calculated to give them experience in and fundamental knowledge of nearly all phases of aircraft mechanics. The school's purpose is not to turn out licensed mechanics, but to graduate men qualified as advanced apprentices in any branch of the industry.

Students range in age from 14 years to 21. Their training comes at that time when they are most adaptable to handling new tools and grasping new ideas. All have one urge in common: to learn an aviation trade; consequently, few treat their schooling frivolously. As Elliot V. Noska, principal, says, "Many boys are captivated by aviation's thrill and glamor. As a result, our school is swamped with applicants, a large percentage of whom are not qualified for this industry's exacting work. Since we are able to accommodate less than half those who apply, it has become necessary to select those best qualified."

Until the fall of 1940, students had been admitted from junior high schools upon the recommendations of their principals, as well as from general vocational high schools at the completion of their first year there. But in September of that year, 1,069 applications were received and 619 rejected. The most desirable prospects are selected through an entrance examination by means of which the principal judges mechanical aptitude and intelligence.

Mr. Noska describes his average student as follows:

"He is born in Brooklyn. In his veins flows a mixture of Irish, German, Polish, Italian and English blood, but he is 100 per cent American in the finest sense of the word—democratic, tolerant and keenly patriotic. He generally can understand, often speak only badly, the language of his parents.

"His chief interest is airplanes. He sees every aviation picture Hollywood produces when it reaches the cheaper neighborhood theatre, is an omnivorous reader of aviation stories and articles. He is no mental giant; his I.Q. is close to 98, which is no more than perfectly normal. At his studies he is no whiz, failing one academic subject somewhere in his school life. He would rather use his hands than his head, except when it comes to mechanical problems.

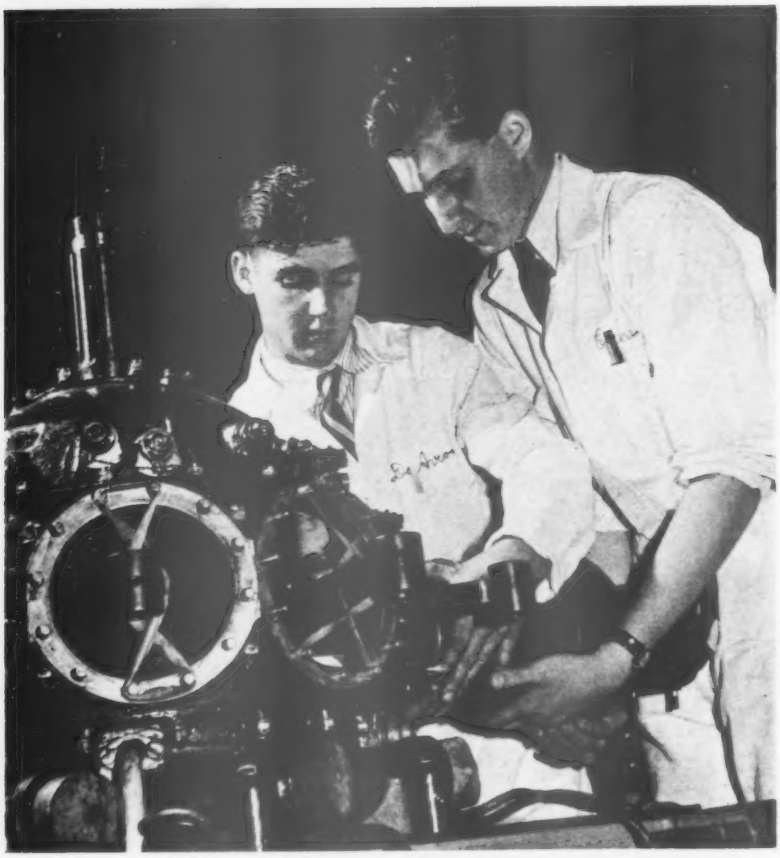
"He enters our school at 15. He is very proud when at the age of 18 his name (in print) and his photograph appear in the graduating class book, *The Solo*. The faculty also feels proud when, after a year or two, Mr. Joseph Smith, a full-fledged mechanic, returns to visit the school."

Joe Smith is in school 10 months a year for three years, six hours a day. Half the school day is spent studying academic and related technical subjects, as prescribed by the Board of Education. These include trade mathematics, trade science, trade drawing, English, social science and health education, all strongly slanted to supplement the shop work.

Let's follow him briefly through his six terms in the School of Aviation Trades. He has entered S.A.T. from a junior high school where he received shop experience in general industrial art work, or he has formerly attended a general vocational high school for a year of exploratory work. At any rate, he usually comes to S.A.T. with one year of industrial high school work under his belt. He is pretty certain he wants to make mechanical work his career. He's here to learn the construction, repair and maintenance of the airplane and the airplane engine.

His third term, the first in the new school, deals entirely with woodwork. Under his shop teachers' close supervision, he learns to read a blueprint. From it he makes a pattern to use in constructing four wing ribs and two spars. During his next term he completes building the wing tip section and adds metal bracings to it. Here he receives his introduction to making metal fittings.

The first half of the 11th year Smitty, who by now is a star reporter on the school paper, The S.A.T. *Log*, makes some wood forms for bending purposes and spends all the rest of the term working in metal. He does layout work,



Worn-out engines, also donated by Army and Navy, differ only a little from radials now in use. The school has $1,000,000 worth of planes, engines and other equipment.

★

Below is a typical S.A.T. class session. Of the 54 shop teachers, only five are college graduates. All are from the aviation industry, their average experience is 12 years.

figures bending allowances, does template work and duplicating work and studies the sawing, filing, drilling and bending of sheet steel fittings, as well as the shearing, bumping and riveting of aluminum alloys.

The sixth term is designed to give the students their first introduction to the variety of jobs associated with airplane maintenance. The course is selected to present to the pupil the fundamental knowledge and skills necessary to repair and service airplanes. One-third of the term is devoted to practice on the machine shop's numerous lathes, milling machines, punches and borers.

Elliot V. Noska.

As Smitty goes into his senior year he gets his first opportunity to work on some of the 78 engines loaned the school by the U. S. Army and Navy Air Services. Included are high-powered radial and in-line engines not far behind those u[illegible] in new planes. Smitty covers in this term nearly all that is involved in a top overhaul. S.A.T. familiarizes him thoroughly with the engine, but cannot make a licensed engine mechanic of him because of the lack of time and operating equipment.

In the last half-year Smith gets a concentrated course on general maintenance and repair, working on one of the seven planes donated to the school by the armed services for that purpose. The school holds a CAA license as an approved repair station.

At some point along the line, Smith will have spliced a broken wing spar, patched a hole ripped in a plane's control surface fabric and perhaps have covered and doped the wing section he built during his first year in S.A.T. He will have learned how to read blueprints and will have helped build a metal airplane's fuselage. Several of the shops have jigs constructed by students in which airplanes are being built.

Before graduation exercises take place, Smitty probably knows just where he is going to work. All during his three years at the School of Aviation Trades, his instructors have been grading our Joe, studying him with a view to learning in what branch of the industry he will be likely to do his best work.

S.A.T.'s placement system is built on instructor-principal cooperation. All school employees are encouraged to keep up their contacts with industrial firms for which they formerly worked. They often visit friends in supervisory positions and turn in job tips to Mr. Noska. A survey of these instructors' backgrounds unearths a cross-section of the whole U. S. aviation industry. Through their contacts in these businesses, the instructors make industrial friends for the school, provide outlets for graduates.

Each student is rated by his teachers on knowledge of procedure, ability to

(*Continued on page* 108)

# Octane Isn't Everything

by KURT RAND

*If you must buy gasoline away from fields, be careful! Auto fuel can be good—and bad.*

WHEN forced down due to diminishing fuel supply, how should one solve the problem of getting back into the air? Do good pilots blithely pour in five or 10 gallons of automobile gasoline, take off at full throttle, and fly merrily on their way? Or should one consider the results of using an unknown, untested fuel and its effect upon engine performance, operation, and useful life?

Some pilots maintain that if the octane rating of the gasoline is known and if it is the same rating as the aviation fuel recommended by the manufacturer of their engine everything is fine. Octane is octane and gasoline is gasoline, today and tomorrow. They cite examples of Pilot Dumbjohn, who has always mixed the fuel he serves his airplane engine. Many pilots believe that if the octane rating is the same, it makes no difference where or how one gets the gasoline. They think that the figure of "73" or "93" or even "66" entitles them to the substitution of automobile gas for aviation fuel.

It is unfortunate that this idea is gaining credence throughout the country. Nothing could be farther from the truth, and it is being proved every day by motor failures, poor engine performance, and short-lived engines. It takes only one bad forced landing to neutralize the previous lucky emergency landings while using the lower-priced fuel.

Let us suppose that due to unforeseen circumstances we have been forced out of our way and have met considerable headwind. This has meant a longer time aloft and a diminished fuel supply. Obviously the smart thing to do is to sit down before we are forced to land, thus selecting a field to suit ourselves both as to location, terrain and wind.

If there is no aviation gasoline for miles, we must accept the best substitute —motor fuel. With that in mind, one should pick a field near a reputable-looking station selling a *standard* brand of gasoline. Some pilots tell of landing on highways, but this should be avoided except under circumstances where a landing on any other spot would mean a crash. Highway landings are difficult, hazardous, and in some places illegal—it is well to avoid them unless absolutely no alternative exists.

Suppose, however, that it is possible to taxi up to the filling station and say nonchalantly, "ten gallons, please." Should we simply sit there while the attendant puts in 10 gallons, wipes the windshield, and takes our money? Literally, not on your life!

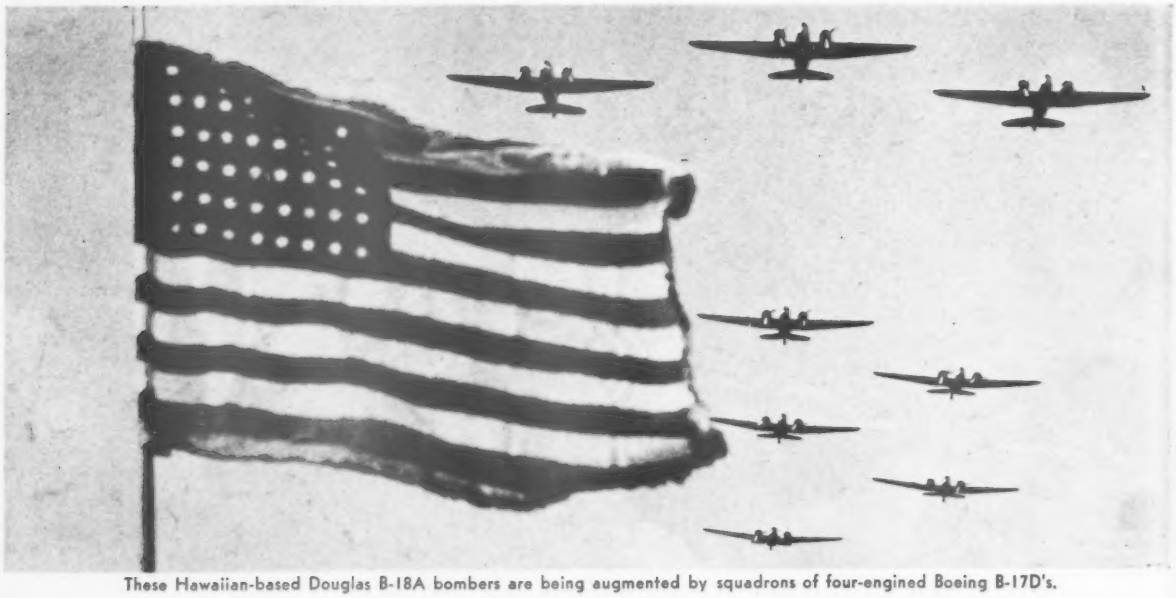
There are a few things to check before putting the metal nozzle into the gas tank. If they do not check, it would be far better to get the fuel some place else, even though it means thumbing a ride to another station.

First, check the fuel pump. Modern pumps are made of glass, and the fuel can be seen plainly. Look closely; is the fuel clear, and the glass clean? Is the hose in good shape—is it reasonably new? Deposits form which can cause a forced landing. A clean pump, filled with a nationally-advertised *first grade* gasoline is positively the least one should accept.

Next, inquire about the octane rating, and see what answer you get, if any Very few attendants know the octane rating of the motor fuel they sell, and they will try to convince you that the octaine rating is all that matters. The point that should be emphasized is this: octane rating is not the only rating a pilot must consider before filling his tanks.

If no information is obtainable relative to octane, use a first-grade, standard fuel

(*Continued on page* 80)



These Hawaiian-based Douglas B-18A bombers are being augmented by squadrons of four-engined Boeing B-17D's.

# OUR PACIFIC AIR DEFENSES

by LYNN THOMAS

*Rapidly being reinforced with Army and Navy aircraft, Hawaii and our other Pacific islands are America's new forts.*

Commercial airports, like this Hawaiian field, fit into Army and Navy defense plans.

MILITARY strategists say the Hawaiian Islands have become the key to America's defense plans in the Pacific. Men like the late "Billy" Mitchell have described Hawaii as the goal towards which an enemy force would strike first in attacking the United States from Pacific waters. That such an attack may be expected is granted by all who have followed the trend of events in Europe and Asia.

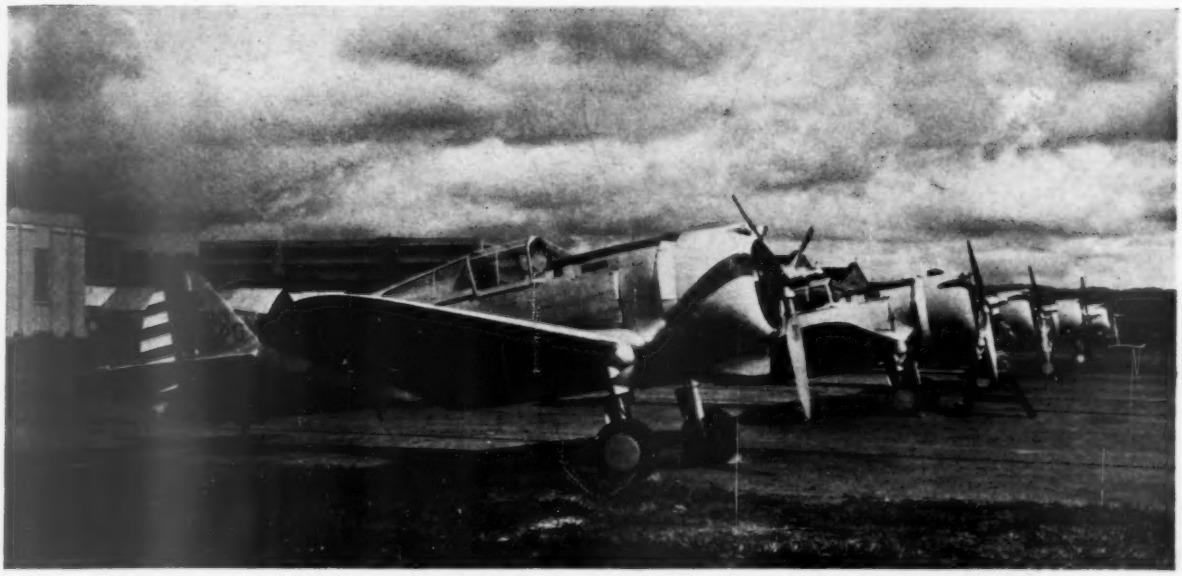
Japan is our greatest menace, high military authorities who are keeping a wary eye on Nippon's moves in the Far East report. With this in mind, the U. S. Army and Navy are rushing an air defense program for Hawaii that is superior to anything ever seen under the American flag.

Fighting planes and bombers, pilots, observers, machine gunners, photographers, mechanics and other skilled U. S. military personnel are being sent to Hawaii in ever-increasing numbers. As soon as the ships are outmoded in any aerodynamic or fighting principle, they are replaced by newer warplanes, capable of defending themselves against all adversaries.

Lying more than 2,000 miles from the Pacific Coast, Hawaii is becoming virtually a guarded military encampment. The new $25,000,000 Hickam Field, one of the world's largest army airdromes, bases the crack bombers of the Hawaiian air force, as the U. S. Army air unit in the islands is called. At famed old Wheeler Field, Curtiss P-36 pursuits and North American O-47A's make up the front line ships, supplemented by other type army planes not important to this story.

The prime question to today's military observer is whether or not the Hawaiian Islands can be taken by an attacking enemy force.

"I think not," Maj. Gen. Frederick L. Martin, Hawaiian air force commanding general, told this writer confidently. "As



Fighters currently in Hawaii are these Curtiss P-36's. Expected there soon are Lockheed P-38's and Bell P-39's.

long as the air force and the Navy are in sufficient strength, there can be no hostile landing in Hawaiian territory."

This bears out the statement made many years ago by the late "Billy" Mitchell, who said: "These islands can be taken by air attack or held by air defense. Possession of the Hawaiian Islands depends primarily upon who controls the air above them."

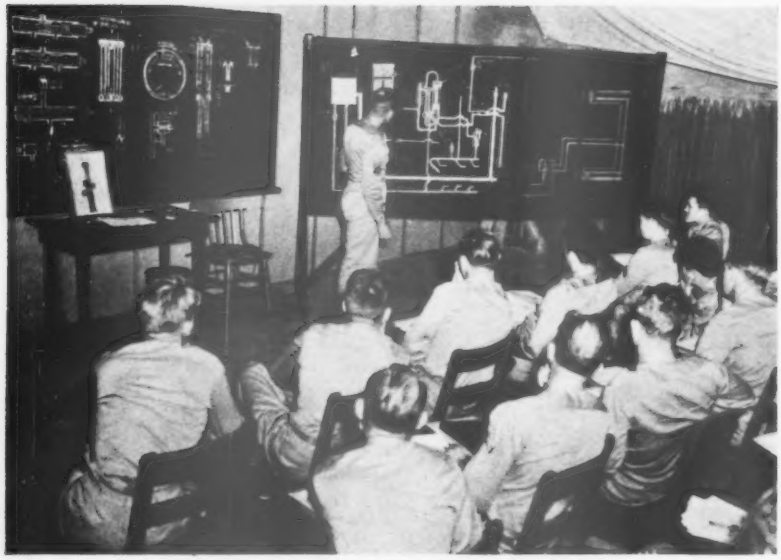
But, as war tension increases in the Far East, our military heads in Washington realize that a definite danger exists in the Pacific and have brought all the native Yankee ability and drive the armed forces of the United States can command into play. They are building up an aerial defensive power in mid-Pacific that can rival any nation's power.

As direct action became the watchword of the Army, word came to Hawaii that many big Boeing B-17 *Flying Fortress* bombers would be sent to the island air bases soon. Twenty-one B-17D's were flown here shortly afterward. Their purpose is long-range bombing, for which they are particularly suited. They are without doubt the finest aircraft of their type in the world. With a 108-foot wing span, 27-ton weight and four 1,250 h.p. engines, they can fly at speeds in excess of 300 m.p.h. with a cruising range of more than 3,000 miles.

Also coming to the islands to supplement the bombing force are many pursuit and light bombardment planes, to be stationed at Hickam and Wheeler Fields. This group probably will include Curtiss P-40 pursuits, Lockheed P-38 interceptors, Bell *Airacobras* and A-20A attack bombers.

The ever-efficient Army isn't neglecting the ground man-power angle in Hawaii, either. They have fine ground schools in all trades and instructors to go with them. The Army was expanding so fast in the technical fields that they didn't have enough men to care for the

Considered a vital part of U. S. Pacific air defense is Pan American Airways' network to China, Australia and Singapore. The Navy already uses many of Pan Am facilities.



Army men constantly learn new aviation developments in modern schools. Now a separate air force, Hawaii's Army air organization is undergoing tremendous expansion.

delicate instruments and new equipment coming into Hawaii. There was only one answer to the problem and that was schools.

Despite the warm tropic air in Hawaii, every man is on his toes. Raw recruits landing in the islands find the same crispness in the sergeants' voices as in the mainland United States' cooler climates.

The Air Corps is encouraging the men who want to help themselves up the ladder. Every man who wants specialized training has the opportunity to take it. This means a better chance for promotion, too. The instructors at the Army schools in Hawaii are not academic highbrows, but regular officers and specialists who make this their regular Army job. The young soldier can learn aerial photography, radio, engine mechanics, propellers, welding, aerodynamics, gunnery, gun mechanics, observation, map-making and a dozen other subjects.

Personnel is being increased rapidly. Another indication of the Army's tremendous growth in Hawaii was the establishment of a separate Hawaiian air force, commanded by a major general who leads all Army air activities in Hawaii. What groups and squadrons will be stationed in Hawaii by the time this article reaches print is an unanswerable question. The entire picture may change within a single week. The national defense program in Hawaii is moving so rapidly there is no means of anticipating the next move our air force might make.

Only recently, Honolulu was startled to find a large formation of new Curtiss P-36C pursuits flashing down low over the city, coming, it seemed, as if out of nowhere. These planes' arrival greatly strengthens the army pursuit forces' strength in Hawaii.

Under the command of Maj. George P. Tourtellot, they came from Hamilton Field, Cal., and Selfridge Field, Mich. Twelve of the pilots are recent graduates of the Army Air Corps training center at Kelly Field.

Commenting on the 'arrival of these planes, Army authorities said: "When the Air Corps organization was changed here a few months ago, it was contemplated to increase the plane strength as soon as equipment was available. We hope to get more aircraft in the near future."

Rising off the waters of Pearl Harbor bay on daily routine patrol flights, PBY patrol bombers range far at sea beyond the Hawaiian area, constantly searching for any craft that might mean the presence of an enemy attempting to come within striking distance of Hawaii.

The Naval air station on Ford Island, located in the heart of Pearl Harbor, is a veritable jungle of hangars, runways, ramps, shops, buildings, storehouses, armories and airplanes of all types and descriptions. Everything that may be needed is on hand that it may be put into action on a moment's notice.

And now a word on the routes and plans which must be used by any enemy force attacking the United States via the Hawaiian Islands, as gathered from the foremost military experts of our day and from this writer's experiences in viewing the equipment and military tactics of the Japanese Air Force in the Far East. There are only two courses for Far Eastern attackers on Hawaii. To get started on either will entail a great deal of hard fighting by the Japanese.

The first point the Japanese must strike is the Philippine Islands, according to some authorities in Hawaii. They cannot set out until they have destroyed the hard-fighting little group of men who form the U. S. Army air force in the Philippines, men equipped with pursuits and attack bombers. The present Philippine air force forms a backing in manpower and some equipment that cannot be forgotten too easily.

If and when the Japanese took the Philippines, they could then start out through their mandated possessions to the eastward and strike at Guam, Midway and Wake Islands, then turn southward towards the Hawaiian group. This would be no picnic, for the Navy is putting air bases and fortifications on all of them.

On the second course, the Japanese could strike southward from the Philippines, use the bases they now have built on their South Sea island possessions, move into the Carolines and Marshalls and launch an attack northward towards Hawaii. Here too, the Navy has been awake.

A consolation to Hawaii's civilian residents is the supreme confidence radiated by the Army and Naval authorities when the question of the Islands' defense is raised. With the bases to the south and islands to the west being heavily fortified, with daily shipments of men and munitions and fighting equipment arriving in Hawaii aboard all types of ships, Hawaii's people feel there is little to fear.

What the military strength of Hawaii will be from one day to the next is impossible to predict. The picture is changing daily for the better. Although Hawaii is already known as the Gibraltar of the Pacific and one of the most heavily armed areas in the world, continual improvements in these mid-Pacific isles' military defenses and air strength make them just that much stronger and less likely to be the target of any foreign power's attack.

END

## Reflex Trainer

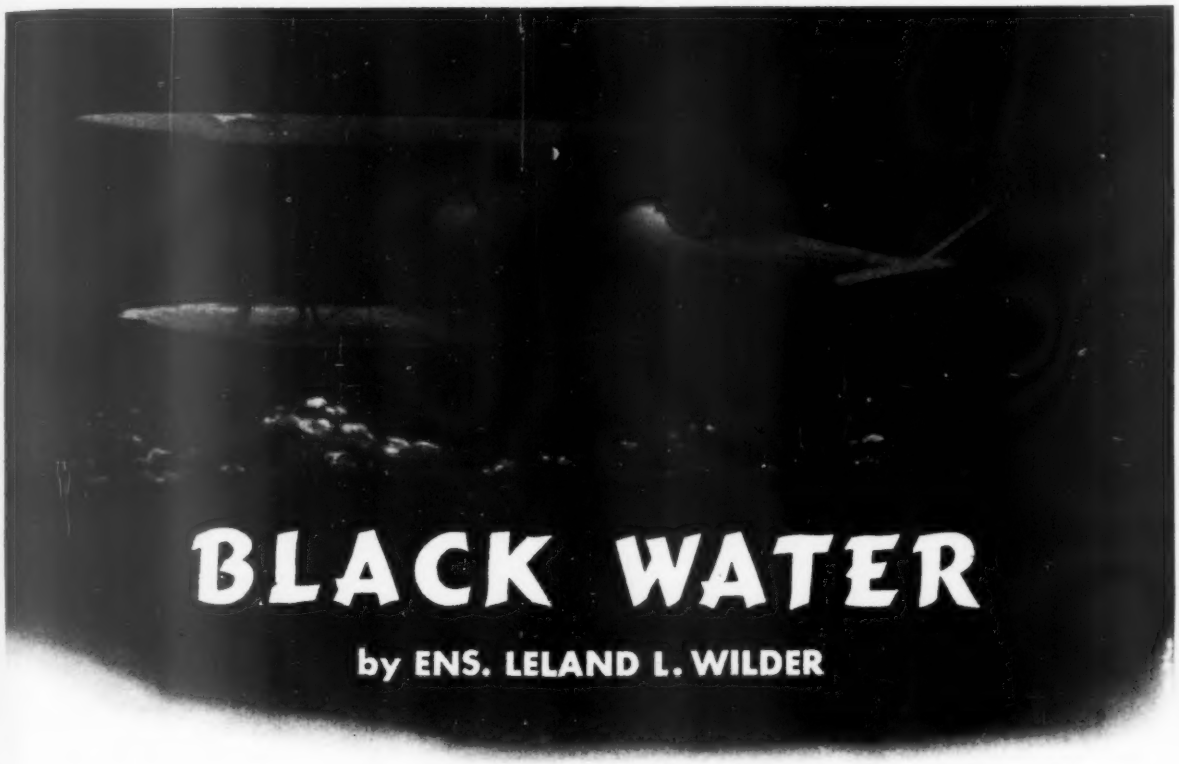
RANDOLPH FIELD cadets haven't yet made up their minds what to call the latest training device "farmed out" to them from Wright Field's experimental engineering section. The trainer resembles a soap-box racer, but is controlled by a joystick. A .22 caliber rifle in its nose is fired at targets towed by miniature autos. The idea is to train students in handling their real airplanes on the ground. Its turns and banks resemble those of a real plane taxiing.

## Pantagraph Router

ENGINEERS at Bell Aircraft Corp., Buffalo, N. Y., have perfected a new mechanism called a pantagraph router, which permits rapid cutting of stacks of sheet aluminum into desired shapes—work once done in individual units. The device has increased production 400 per cent.

## New Italian Bombers

A NEW Italian seaplane bomber, the Fiat RS-14, is reported by the British. An all-metal, midwing monoplane, it has two 840 h.p. Fiat motors. Span: 64 feet; length: 45 feet; wing area: 590 square feet. The Cant Z-1008, another new Italian bomber, is reported in mass production.



# BLACK WATER

by ENS. LELAND L. WILDER

Ens. Leland L. Wilder.

*A pilot's first solo is his big thrill, but the Navy gives him another at Pensacola. Landing a seaplane at night is an experience that one doesn't forget.*

The author made his first seaplane landing at night in the N3N-1 above.

THERE are three top thrills, they say, for a Navy flyer: his first solo, first catapult take-off and first carrier landing.

Under the Navy's present system of pilot training at Pensacola, those of us who will fly single-float seaplanes from battleships and cruisers miss the carrier landing. To take its place we have the first night seaplane landings solo, enjoyed as keenly as any phase of the course.

The first solo hop brought new sensations. So does the first night solo on floats. Night technique, whether in formations, take-offs or whatever, is different. That's most important in landings.

Three hours' night instruction have gone before. Tonight it's solo. Pilots' conference at 6:30 in the officers' ready room. Signals for formation tactics. Ground to plane signals. All the varied information necessary for the first night take-off in Squadron One, listed on the schedule. At the top, your name and plane number. Flying Plane 3 tonight, in No. 2 position in the first formation. That's on the left wing of the Vee, and you'll fly only a three-plane formation. Take-off at 6:55.

A review of signals freshens them in your mind. Then you're ready to check out a parachute, flashlight, and life jacket and climb into the rear cockpit of No. 3. From your ten-foot perch above the concrete warm-up platform by the hangar, where your plane sits on a dolly till your turn to "go over the side," you can see all the other ships that will be aloft. The crews are standing by. Propellers idle over. The engines mutter and wait. Five Navy-built trainers, painted yellow with black fittings, are lined neatly up opposite you—N3N-1's. Ahead, past the inclined ramp down which you'll roll into the water, the bay stretches south, cut by the narrow, tree-dotted spit of Santa Rosa Island. Beyond, the Gulf of Mexico, still blue in the late daylight.

You look back in the cockpit, check your instruments, run the engine up to 1,000 r.p.m. and test both magnetoes. Flip on the dash lights and the signal light on the turtleback just aft of the cockpit. Both working. Okay. Thumbs up to the plane captain; you're all set.

Being eighth man over the side lets you watch seven others get the signal to turn up their engines and roll slowly out across the concrete and down the ramp into the water. There goes No. 1. A hook and line are attached to his plane dolly and he jolts down the ramp and splashes the water. Then he's afloat and the engine roars as he taxies out. The propeller whips a white froth of spray and foam behind.

Then your turn comes and you're out there yourself, opening the throttle and taxying away. It's all yours, for the first time at night—and there's an infinite difference with that empty cockpit ahead.

Well, it'll be twilight for awhile, anyway. Plenty of light in the west. Over your left shoulder as you turn into the wind to follow your section leader off the moon, yellow and round and almost full, hangs half an hour above the horizon.

In the air, you circle left to conform with the course for these wind conditions. Thunderheads are banked in the north, full of deep blue shadows and rain. Now there's a flash of lightning in them and, but for the propeller's roar, you'd hear the roll of thunder. Well, let's hope the storm doesn't move in. The air is smooth and cool and, as you climb for your hour in formation, Pensacola's lights reach out to the northeast, brilliant neon jewels set in black shadows. South of them is the high-

way bridge across Pensacola Bay, a four-mile, illuminated straight edge.

How smoothly the ship handles! To be aloft again in a plane so light, after hours in the heavier, service type ships, is like dancing with a charming, graceful woman. Sixteen-hundred feet. You level off. The section leader flies half a mile ahead, slowed down in a left turn to wait for you to join him. As you close in, his plane is a dim outline beginning to reflect the yellow moonlight, with his wingtip lights brilliant. Red to port, green to starboard and a white one on turtleback and rudder.

You slide down into position: a 45° angle to his left and astern, 40 feet away and 15 feet above. The No. 3 man eases down in his place directly opposite you. Left hand moving the throttle gently open or back as you lose or gain, right hand on the stick, feet on the rudder pedals. In section Vee, and all set for crossovers into echelon and back.

There's the leader's first signal, on the turtleback light. Off an instant, then on in a dot, dash, dot. "R", for right echelon. He repeats it. You reached for the stick with your left hand, your right goes to the switch at the side and you practice repeating the signals as he gives them. Then a long dash—"execute." That means to start the maneuver.

A quick glance at No. 3; he's in close. You ease off throttle a hair, to fall a few feet behind. Then open it again and come gently back with the stick—climbing above the other wing man. No bank to your wings, now, but you ease on right rudder gently and skid across above No. 3. Keep his running lights just ahead of the front of your lower wing; just below and ahead. Not too high, now—not too fast. Now, you're beyond him and above. Ease on the other rudder—gently. There! Straightened out and you drop easily down to the right step-up.

Watch the leader, ready for a turn. He banks away from the echelon. Roll into it exactly with him; keep your wings level with his. Ease on throttle to pick up speed. You've got to turn further on the outside. Around to the left, steadily, smoothly and then he banks out. Roll your wings out with him and ease off throttle to lose your extra speed.

Dit-dit-dit-dah. Dit-dit-dit-dah, he flashes the code for "V", the signal to return to Vee formation. You ease back again to your original position. There's the other wing plane 50 feet to the right, smooth and steady, silhouetted below the moon. . . .

So it goes for an hour, in gentle turns around the bay. Occasionally you increase the interval between planes, until you can relax on the controls and take your eyes off the leader for short periods. Under you and to the north swing the city's lights. A big, glaring patch of light batteries at a night ball game. Directly beneath are the long, lighted fingers of the docks, pointing rigidly. All is outlined against black night now and the storm's sullen darkness in the north has drowned the flash of lightning.

You pick up the lights of a big patrol boat from Squadron Four, floating along above you, steady as a rock in the still air. One of the Consolidated P2Y-3's, recently out of a service squadron. He flies alone, around the same course at a different alti-

(*Continued on page 90*)

by HURD BARRETT

THIS month we're going to devote most of our space to answering accumulated letters from readers; but first, we'd like to point out a few facts useful to all of you. The OPM's Sidney Hillman has stated that in the 12 months from July, 1941, to July, 1942, the aviation manufacturing industry will increase employment from 200,000 to 1,000,000 persons! This means that a year from now, there will be *five* times as many people building aircraft as there are today. This in spite of the fact that our present aircraft employment is far greater than it was in July, 1940.

*Now* . . . A million people is a whale of a lot of folks—almost as many as are in the new American armed forces; and with the manufacturers looking for that many people, there should be no excuse for anyone who wants a job in the aircraft manufacturing industry not getting one. Hundreds of large and small manufacturers make specialized aircraft parts. Each of these, also, will be taking on men. Mechanics, instructors and clerical personnel will be needed to keep up with the soon-to-be expanded civilian training program.

In the main, though—and this jibes with what we've been saying all along—, the men who are *trained* to a particular type of work will get the best jobs and will have the best chances at advancement. Many unskilled men will be hired, of course; but no employer will take on an unskilled man if he can find one who is already trained and ready to do the work he wants done.

* * *

Douglas company figures will show you how much importance large manufacturers attach to training. As of May 1, 1941, this concern directly was training 4,966 of its own employees to fit them for better jobs. Included were company-sponsored public school classes, university extension courses, leadmen's training conferences, supervisors' training conferences and technical lecture courses for engineers. A bureau steered employees into the courses the firm wanted them to take. A special division furnished instructors from among the company's personnel to teach prospective employees in the public and private trade schools' company-sponsored courses.

This program is not unique. Most of the larger companies employ similar techniques. Since most of them have found that the large majority of their new employees are trained only to the point of *minimum* employability, much of their emphasis has been placed on training of personnel for better jobs, *after* they once have been employed.

Those of you residing near one of the larger aircraft manufacturing centers (Buffalo, N. Y.; Hartford, Conn.; New York City; Baltimore, Md.; Wichita, Kan.; St. Louis, Mo.; Nashville, Tenn.; Seattle, Wash.; Los Angeles, Cal.; and San Diego, Cal.) and who can't afford to take even basic training through a commercial trade school, have en excellent chance of securing free training through your local public school. Many offer some sort of primary training directly designed to prepare students for employment in aircraft manufacturing.

If you live near one of the cities mentioned above, contact the adult education director of your city schools; ask him what courses are offered and the requirements for enrollment. Sometimes you will find there is a waiting list for these courses. In that event, if you know someone who is influential in your town—and you can convince him that you are better than average material—he may go to bat for you and get you special consideration. tion.

Many such public school courses operate under the National Defense Training Program and employ as teachers men who are actively working at some specialty at one of the local plants. These teachers instruct in their spare time. Students are trained with blueprints, tools and material from the factories themselves. The instructors are up to date on their subjects and you'll get good practical stuff you can use. These courses, moreover, seldom offer classes except where an active demand exists among local employers for graduates. If you complete one of them, you should be set for a job . . . pronto! Why not give it a whirl? . . .

* * *

Miss D. S., Austin, Tex. We don't believe anyone who wants to hire you will worry very much about your small stature. What they will worry about, though, are your qualifications for a job. From your letter, I judge that you have no specific aircraft experience. In that event, your best bet would be to get something in the clerical or stenographic line—or perhaps, if you know how to run one, a job on a comptometer or telephone switchboard. While there are mechanical jobs for women in aviation, the greatest percentage of women do the type of work mentioned above. Any previous office experience you may have had—no matter what kind it is—will give you a better break toward getting into a factory. We do not know of any jobs for women in aviation outside of the United States. . . .

* * *

H. S., Plainfield, N. J. We can't rec-

(*Continued on page 78*)

# STABILITY

## by GEORGE H. TWENEY

*Here is an explanation of an important technical phase of aeronautical engineering, graphically illustrated by a leading expert. It is valuable to flyers and designers.*

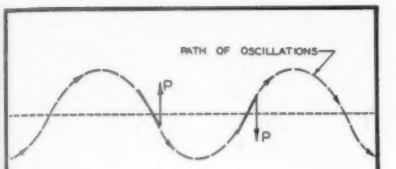



FIG. 1 STATIC STABILITY

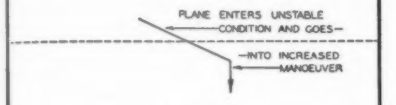



FIG. 2 STATIC INSTABILITY

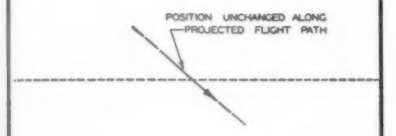



FIG. 3 STATIC NEUTRALITY

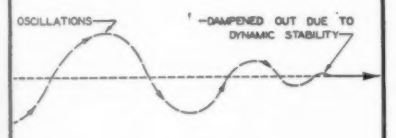



FIG. 4 DYNAMIC STABILITY

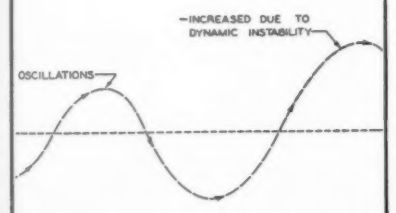



FIG. 5 DYNAMIC INSTABILITY

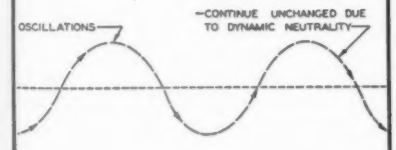



FIG. 6 DYNAMIC NEUTRALITY

MANY pilots, both private and commercial, have bought airplanes and never really understood the meaning of that more or less mysterious word —stability. Why must an airplane possess good inherent stability and why does one type ship have better stability than another which may, from all exterior viewpoints, look exactly the same? Suppose we dig into the facts, and see for ourselves just what all this discussion about stability really has in it. Then, the next time you go out to either buy or fly an airplane, it won't be so mysterious.

Most pilots like to talk about the ability of a certain airplane they have just flown, to fly "hands off." Although they may not realize it, they are merely expressing an opinion about the stability characteristics of that particular airplane. A lot of more or less proficient aircraft salesmen will talk to their prospective customers in vague terms, about "dynamic stability" and that their airplane has built-in "static longitudinal stability." The customer will nod his head in agreement and trust that the salesman knows what he is talking about. Then they fly the airplane themselves and, if it seems to feel satisfactory on the controls, they buy the airplane—all other points having been considered. If this customer had had only a fundamental understanding of the nature and facts of the different types of stability he could have flown the airplane and proved its virtues or vices to his own satisfaction. He would not have had to depend on the word of the salesman—even though the latter may have known what he was talking about.

Stability may be defined as the property of a body which causes it, when disturbed from a condition of equilibrium or steady motion, to develop forces of a character tending to restore the body to its original condition of motion. For an airplane, this means that if it is flying in a given direction and something happens to throw it off the straight path, forces will be set up which will tend to restore the airplane to its original path. An airplane in which these things occur is said to be "stable." When there are no forces set up to restore the airplane to its original path, it is said to be "neutrally stable" and, where the forces tend to throw the airplane still further from its original condition of flight, the airplane is said to be "unstable."

An airplane may possess stability about any one of its three axes of motion. That is: directional stability, lateral stability and longitudinal stability. Since the first two types may be built into any airplane by purely mechanical means, the latter type of stability assumes major importance. Longitudinal stability is something about which very few airplane designers are conversant and, in a lot of airplanes, is very often the criterion between success and failure. Henceforth, when stability only is mentioned, it will be inferred that we are talking about the longitudinal stability characteristics of an airplane.

There are, in general, two distinct types of longitudinal stability, static stability and dynamic stability. Static stability occurs whenever an unbalanced force is set up to return the airplane to a normal flight. For example: when forced into a diving attitude, the airplane should return to level flight. Dynamic stability occurs when a dampening effect is set up to dampen out the resulting oscillations whenever an airplane departs from its level flight attitude.

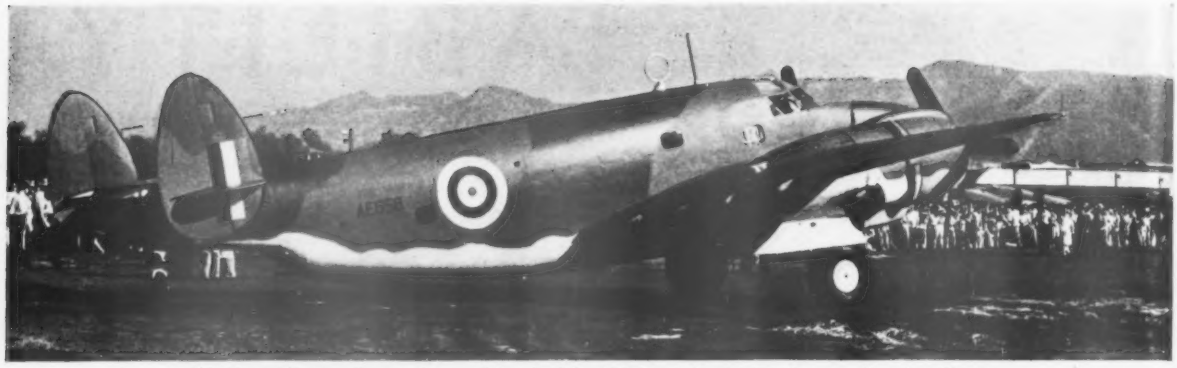
Each of these two basic types of stability is in turn divided into three classifications: stability, instability and neutrality.

Figure 1 illustrates the case of static stability. When an airplane is deviated from its normal path of flight along the longitudinal axis, it will tend to oscillate or "porpoise" in an up-and-down fashion as shown by the dashed line. In performing these oscillations, the unbalanced force "P" will be set up which will tend to return the airplane to level flight. It will be noticed in the diagram that, when the airplane is travelling down in its oscillations, the force "P" acts in an upward direction, tending to force the airplane back into level flight. Also, when the airplane is climbing in its oscillation, the force acts down, tending to pull the airplane down into level flight again.

In the case of static instability, when an airplane assumes an abnormal flight attitude, no unbalanced force is set up which would tend to right the condition and the airplane continues on into its unstable maneuver. For this reason—and also due to the fact that the airplane continues into increased instability—there are no oscillations set up in static instability. Figure 2 will illustrate the condition for static instability.

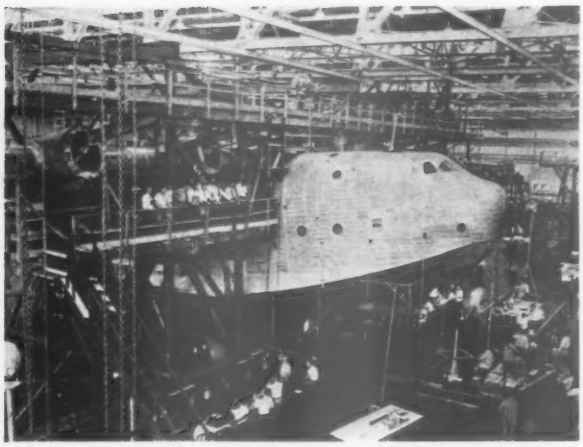
For static neutrality, such as illustrated in Figure 3, the airplane will continue unchanged in any unstable condition due

(*Continued on page* 92)



This Vega "Ventura," one of several hundred for Britain, is the initial plane produced at Vega's new $7,000,000 Burbank plant. Army authorities say the ship is fastest for its size yet built.

# HAVE YOU SEEN?

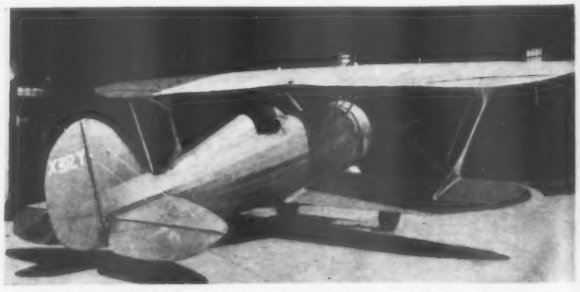


Martin's XPB2M-1, world's largest flying boat, has 200-foot span. Built for the Navy, it is an experiment like Army B-19.

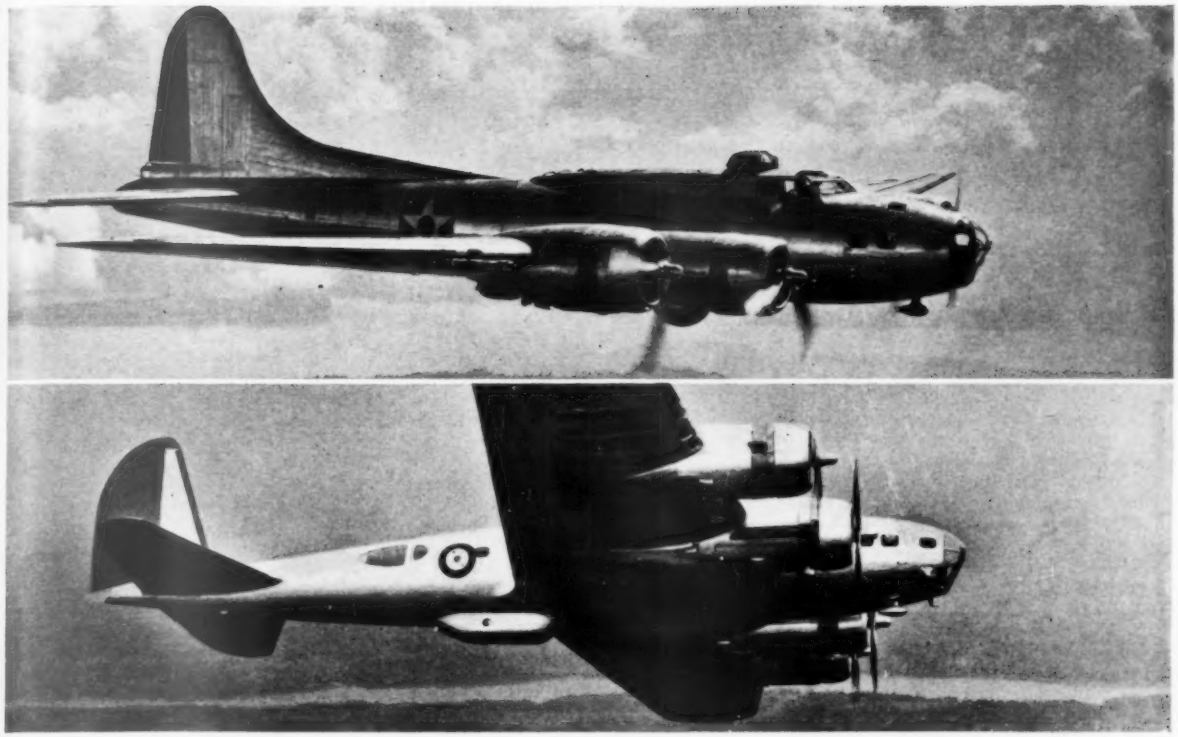
First photo of Army's new Curtiss-Wright AT-9 trainer. It is two-place job with retractable gear and two 300 h.p. engines.

Weighing only 100 pounds, this two-cycle rotary plane motor develops 100 h.p. Its inventor is C. H. Roberts of Burbank, Cal.

This unique ship was built by V. F. MacDonald of Detroit. It has new control mechanism for aileron-flaps and wing slots.

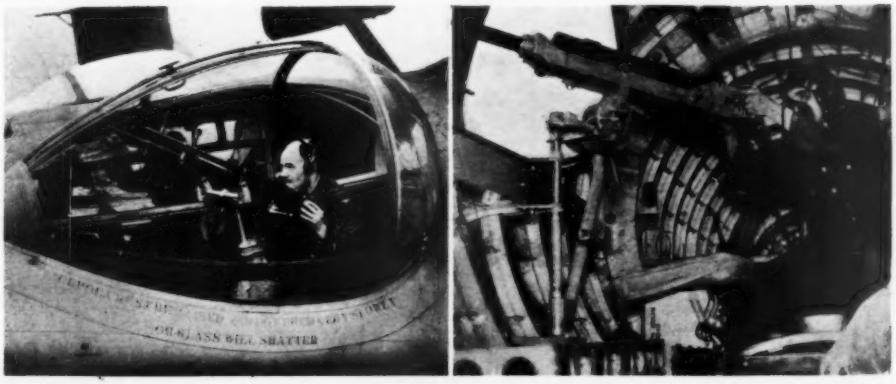


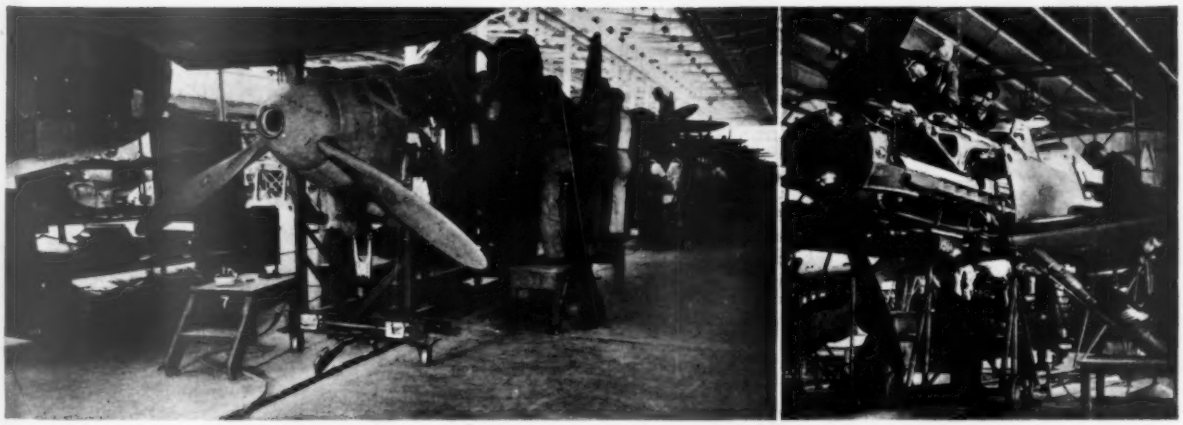
Roy Hunt of Dallas, Tex., redesigned and rebuilt this Great Lakes for Lycoming engine, replacing ship's original Cirrus.



Latest Boeing is the B-17E (top). It has three power-driven turrets and "Stratoliner" tail. Side gun blisters have been eliminated. Compare it with American-built British B-17C model above.

These .30 caliber guns mounted in blister of "Catalina" flying boat and the .50 caliber gun in British "Flying Fortress" (extreme right) are typical of the armament now being used abroad.





Almost identical are these production lines at Bell's new Niagara Falls plant (left) and German Messerschmitt factory. Chain conveyor method for P-39's is more modern than Germans'.

## Fly North, Pilot

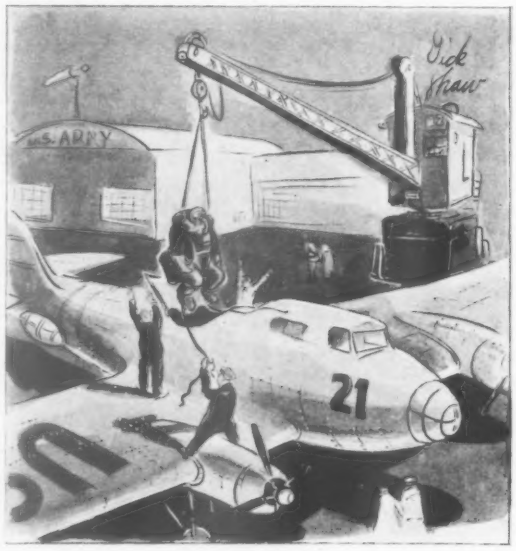
(*Continued from page 57*)

know just what to do, how far from the camera we must do it and what the camera is getting while we're flying. The "bush flyers" would have caught on quickly, but not fast enough when production costs are piling up at the rate of hundreds of dollars per hour. And, vice versa, none of us would be able to do the things those lads north of the border can do with their heavy duty, slow flying ships.

The transition from the *Cub* to the Fairchild "71" was as easy as the transition from landplane flying to the floats. The only recommendation I can make to the lad who is making the change-over is that he knows something about sailing a boat. It'll stand him in good stead. But, fundamentally, there isn't much difference between wheels and pontoons. Later, I was to learn that when you are taking off cross-current and upwind it's a little confusing, but not seriously so.

You have to watch your drift so you don't pile up on shore—and remember that you haven't any brakes. All of us flew about 35 hours during the five weeks that we were up there. Out of the entire trip there was just one bad landing. One of our boys set a ship down too hard and damaged the tail surfaces slightly, but that was all.

We jumped from a week's work at Ottawa to our northern base. This was at North Bay, in the heart of the lake country, or aren't there lakes all over Canada? It looks like it. The whole company stayed at a hotel there — swell accommodations—and we started work at 5 a.m. and thought nothing of it. The bush flyers told us that up in that country there are two seasons, one being July and the other, winter. However, flying is reasonably good from May until late September and early October.




North Bay was just our base of operations as far as the sleeping and eating parts of the job were concerned. Actually, sets for the production were built on four different lakes which we used. We flew off about 25 different lakes. The director won't like to read this, or maybe he'll just laugh it off, but the airplanes got to locations so much faster than the other equipment that we often tossed out an anchor and swam or fished for a couple of hours. Don't let anybody tell you those northern lakes are cold. The swimming was great, even if we were 250 miles directly north of Toronto and approximately 300 miles west of Ottawa. The fishing was excellent. If you don't like sitting on a pontoon, you can fish right out of the cabin door.

Flying is routine. First it's trees, then more trees and finally trees fringing a lake. You go over the fringe, cut the gun and let her down. The lakes are all big, and you never feel, even in a heavy job, that you are going to run out of "field." You simply let the ship come in and touch at the best gliding point. On take-off, you have all the room in the world. I had heard a lot about judging distance from floats to water when the surface was smooth, but only one of us had any difficulty and that was only once. The lakes are so close together that if you get any altitude at all you can count scores of them.

The amazing thing to me was to arrive in the country in the middle of July, which is in the middle of everyman's vacation, to find so little flying going on One of the bush flyers has a private job he operated practically for his own amusement—a standard Waco—and while playing around for a month I saw two other jobs, a twin-engine Beechcraft and a gull-wing Stinson. I didn't see a single conventional two-place lightplane, when there should have been hundreds of them. When I go up on my vacation, believe me, that's the kind of a plane I'm taking with me.

You get a great kick out of learning the way the bush flyers get around. In the first place, they have no radios. There are no short wave stations, so they wouldn't mean anything. Flying up there is done with 1) a good compass, 2) figuring elapsed time, 3) figuring your location by the sun or anything else handy 4) a map and 5) a horseshoe. Until you've been around a few years, all the lakes look alike.

The ships themselves are revealing. You find you are flying with 60 pounds of rations, just in case you get lost, which is apt to happen at any time; hatchets and axes to clear your way out of where you land, if there isn't any water around, or to build a fire; plenty of rope; emergency medical supplies which make the CAA requirements seem lenient, and a paddle. Nobody has been able to figure out what the paddle is for, unless you settle down and build your own canoe. Try paddling a Fairchild "71" and you'll know what I mean.

Personally, if my wife doesn't happen to be along, I'll take an outboard motor in my little craft when I go on my jaunt.

A bush flyer can't explain how he flies. He has a sixth sense which gets him where he wants to go most of the time. The rest of the time he gets lost. Bud Jones, one of the "bushers," told me that during his two years north of the United States he has been lost twice, once for 11 days, again for two days.

"Those emergency rations begin to taste pretty good," he told me.

Nobody thinks anything of getting lost. Down in the States, there's considerable criticism when a pilot wanders off some place he hadn't intended going and probably didn't know existed. Up there, the whole gang turn out to a man, starts searching and, when it is all over and the pilot is found, the rescuers will say:

"Tough luck, fellow. Happens to me quite often, too."

The toughest haul I had while I was up there was a 60 mile hop from Trout Lake—where our ships, chartered from the bush flyers, were tied down—to Jumping Caribou Lake. Luckily, I had an "engineer" (which is Canadian version of the United States' A and E mechanic) along. He knew his way better than I. We knocked off the 60 miles in three hours, taking off and flying below the level of the 60-foot radio towers at North Bay. We flew until we found a fringe of trees, grazed them as we went over, dropped down to a couple of feet off the water along a lake, hopped the fringe and finally had to give up 3½ miles short of Jumping Caribou Lake.

"Think nothing of it," my flying companion said, when I lamented over not making my destination. "It happens all the time."

The explanation of the fogs, morning and evening, is that the warm summer air absorbs a lot of moisture. It cools quickly at sundown, with the resultant condensation remaining until late the following morning. The fog is very treacherous while it is in and often blinds you out when you are two feet off the water. The only thing to do is to pull back the throttle and sit.

Canada, if I understand correctly, places the burden of maintenance of aircraft directly at the door of the "engineer." On the equipment we chartered the "engineer" made the daily inspections, adjustments and repairs and reported "all's well" to the pilot. I think if this responsibility was shifted from pilot to mechanic in the United States, maintenance of private and commercial aircraft might improve considerably.

(*Continued on page 104*)

# PIPER POINTS THE WAY TO
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THE complete Piper Coupe is the plane for the private owner who wants to "go places" safely, comfortably and with utmost economy. Everything you need is included as standard equipment without extra cost. Navigation lights, battery, hydraulic brakes, parking brake and key-locking ignition are but a few of the numerous features which have made this plane so popular. Visit the Piper Dealer at your airport and fly the Piper Coupe. Check its equipment against that of any comparably priced plane and you'll see why private owners the country over are buying this ship . . . the plane they can fly with complete confidence, ease, comfort and economy. The Piper Coupe is priced at $2575. Other models include the three-place Piper Cruiser at $2150 and the famous Piper Cub tandem trainer, priced from $1560. All prices F.A.F. Lock Haven, Pennsylvania, and subject to increase without notice. Available on the easy payment plan through all Piper Dealers.

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*Continental "65" Piper Cub Given Away Each Week*

# PIPER
**OUTSELLS ALL OTHER LIGHT PLANES COMBINED**

## Sixteen Dollar Airport

(*Continued from page 54*)

By sheer diplomacy, Dalton and his committee negotiated with the field's owner, Fred Loucks.

"Sure," said Mr. Loucks after hearing the glider pilots' story. "You can have the field for as long as you like. You can make an airport, plough it up for corn, raise potatoes or do anything you like with it. No, I don't care if you cut down the trees, burn off the weeds or pull up the brush. Take it—it's yours for as long as you like." Mr. Loucks refused to rent it, lease it or sell it. Now he often sits on the sidelines of what is officially known as "Loucks Field—the Schenectady Gliderport" and watches with amusement "the kids who turned my pasture into flying field."

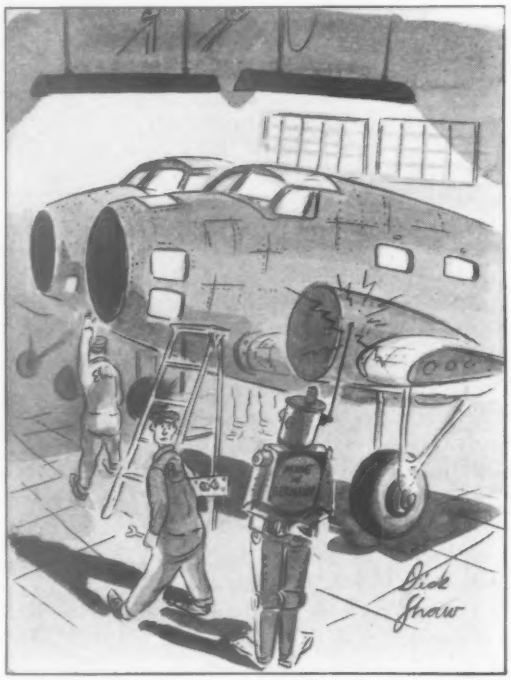
While the final payment on the Franklin was being raised, the club took advantage of early spring weather and got the field ready. Young men, older men—and three girls who typed and filed in the General Electric Company for a living—donned old clothes, grabbed picks, shovels, rakes and hoes and went to work. Ingenious Dick Dalton and his diplomacy produced a tractor from a neighboring farm. All the members had to do was provide their own gasoline and the tractor was theirs. Dalton did it again. He wangled a gasoline station operator into providing gasoline so long as club members who owned cars patronized him. Club members accepted and the deal still is working well.

For three weeks the club members labored under hot April and May suns. More wangling produced a roller, and a drag was constructed of old timbers and spikes. The club's personnel, which includes farm hands, typists, engineers, an artist, a newspaperman, machinists and persons of a dozen other occupations, slaved away. The engineers laid out runways, the smallest 1,800 feet long. The farmhand ran the tractor, the typists pulled weeds, the newspaperman started burning debris and yipped happily bebecause it was the first fire in two years that he didn't have to cover on assignment, the machinist repaired the tractor when it stalled, the artist blistered her hands on a shovel and the holders of other occupations did back-breaking labor.

The club's big day arrived May 12, 1940. The night before, a long distance call to Elmira had assured the group that the ship had been thoroughly checked, put in first-class shape and was ready. Instructor Coyle and Bob Burt, a member, volunteered to travel the 200 miles from Schenectady to Elmira and bring it home.

The club turned out en masse to welcome the ship to Loucks Field. Late on a Sunday afternoon it arrived, bright and shining on its trailer. Under Coyle's direction the members divided into crews of four persons each and spent several hours assembling and disassembling the ship, becoming familiar with its construction and operation. Coyle made the first flight down the one runway declared adequate for an automobile tow, while the group cheered.

Labor on the field continued as instruction began. On the east stood a four-foot knoll which would provide trouble. Efforts to hack it away by hand had failed. What was necessary was a large scraper. After considerable deliberation, the membership decided to spend the money necessary for the rental of a scraper. For $16 a good part of the knoll was knocked down and the runway made suitable for automobile tows. That was




the total amount of cash spent on the field—$16!

All through the latter part of May and through June Coyle gave instruction on the field. His course began when he familiarized the members with the workings of the controls of the Franklin. Included in the membership are several power-plane pilots who were soon making hops off the field. They are now aiding other student flyers by coaching them in co-ordination on the ground.

Coyle utilized the knoll at the end of the field by staking the ship at its top, pointing the nose to the wind and teaching the students lateral control. Gradually he worked them up to tows across the east-west runway. Not permitting them to leave the ground, he taught them how to hold the ship's wings level and how to control the nose and make the ship behave. The use of brakes and the all-important release of the towing rope was taught by him.

Before June was out, Coyle had been given a re-rating as an instructor and three members had won private ratings before the CAA inspector at Schenectady. Some of the more advanced students were getting up and out, making 180° and 360° turns over their training field—which wasn't built for soaring.

The ship took the usual beatings of all training craft. One girl student dug a wing tip. Another student permitted the ship to bounce him around and cut up the nose. So an extra training skid was fastened to the ship. A light metal protector was bent over the nose to prevent further damage. Easily removable, it is used only for student training and taken off when soaring hops are made. All of the damage was repaired by club members at no expense, of course, no one was injured in the mishaps.

Loucks Field began to polish up as time went on. While students were being instructed all members, regardless of standing, pitched in and filled up holes left by trees which were removed or cut down. "Dead furrows" were filled and leveled. The tow cars began to hit speeds upwards of 40 miles an hour and take-offs were being made in almost every direction. Approaches were cleared as the students progressed and power pilots began to show interest in the field. The county airport is located but a mile and a half airline from the gliderport. Usually the power ships give the motorless flight area a wide berth. Now they began to stick the nose of their ships in the direction of Loucks Field. Watching operations from above they became curious. One started the ball rolling when he dipped low and waggled his wings for permission to land. The glider pilots welcomed him heartily, let him try their ship and heard with satisfaction his praise of the runways. In a short time other pilots began to drift in. Before long, what trouble had been experienced in the club's infancy was forgotten. The power pilots began to hint that they thought some really long flights could be made from the 3,000 foot runways of the county airport.

That was what the glider pilots had been waiting for. The Franklin was towed to the field and some excellent flights were made. Coyle, Dalton, Burt and Eddie Bunke found thermals in abundance at the county airport, whereas they had been missing from the glider port. A little soaring was done.

Before long a meet was scheduled. It proved to be the biggest set-back the glider club ever had experienced. Briefly, everything went wrong. Gliders enroute to Schenectady were damaged in automo-

(*Continued on page 102*)

# WHEN THIS JOB'S DONE

## *I'm Getting an* AERONCA!

"When a pilot gets his wings in this man's army, he really knows what airplanes are all about. And it doesn't take very long to find out that there are certain basic qualities that every good plane, whether it's a trainer or a bomber, must have. I took my first hours in an Aeronca, and believe me, the more I fly, the more I realize what a truly fine airplane the Aeronca is." So swing in, all you air-minded Americans! Go to your Aeronca Dealer and get that "big ship" feel behind the controls of America's finest light airplane! You'll find so many outstanding features that nothing but an Aeronca will satisfy you. The Aeronca Aircraft Corporation E-11 Municipal Airport, Middletown, Ohio. Cable address: Aeronca, U. S. A. Exclusive Export Agents, Aviation Equipment and Export, Inc., 25 Beaver Street, New York City.

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**FREE** DESCRIPTIVE LITERATURE . . . DEMONSTRATION . . . INSTRUCTION PLAN

Your Dealer has them for you. So talk to him or write to Aeronca.

## Want a Job?

(*Continued from page 70*)

ommend trade schools by name, although the one you mention in your letter is supposed to be tops. We've been into this instrument thing before, particularly in the July, 1941, issue. We said there that the manufacturers sometimes hire watchmakers as such and then break them into instrument work. Why not take a run over to Republic Aircraft, in Farmingdale, L. I., or Brewster, in Long Island City, and see what happens? Ask for instrument-installation work and explain that you're a watchmaker. Or, for that matter, the Pioneer Instrument Company, one of the largest manufacturers of aircraft instruments in this country, is located not too far from you, in Bendix, N. J. You should have a good chance there. You can write them a letter first, if you like, telling them the same things you told us. It should be sent to the director of personnel.

* * *

A.A.K., Albion, Mich., with a degree in mechanical engineering, your knowledge of math and all of the experience you've had in drafting, you should have no trouble at all getting an aviation job. You are not aquainted with aircraft drafting symbols, nor with aircraft design problems, however; therefore you might not get as good a job as the one you now have. We always hesitate to recommend that anyone leave one job for another but if you are convinced that you won't be content to work up where you are now, you might contact—either directly or by letter—any of the many Detroit factories doing defense work. We might warn you, though, that due to the curtailment of automotive production this year, there may be a temporary technological unemployment in that district. Whether it will apply to engineering personnel or not, we can't tell you. Our personal advice to you, if you are dissatisfied with your chances of advancement, is to try to get work with some other firm—*but in your own line*. It seems a shame to lose several years of specialized experience and to have to start fresh unless you absolutely have to.

* * *

T.T.W., McAllen, Tex. You sound like a good, all-around mechanic. Your services should be valuable to any aircraft manufacturing company, particularly as a welder or metal fitter. To get a job as an aircraft welder (on aircraft parts, as distinct from jigs or tooling) you will have to have passed your Army and Navy tests. What we'd suggest is that you apply for work as a metal fitter and then, after you're hired, see if you can't work into aircraft welding. If you can do the things you say you can and can read blueprints, you'd be better at making metal fittings than a lot of men who are earning wages as senior metal fitters.

You ask where you should go to break into aircraft manufacture. Due to your geographical location, we'd say Southern California. There are a round dozen fairly big airplane factories around Los Angeles and San Diego, including Lockheed, Vega, Vultee, Douglas, North American, Northrop, Ryan and Consolidated. One of them should find a place for you. But bring a car to get around from one to another and enough money to see you through a month! The distances are something awful and the public transportation is meager.

* * *

J.A.S., Glendale, Cal. We can't give you any definite information on the openings for aircraft mechanics out of the United States. Many of the Latin-American countries you mention have restrictions on the employment of foreigners, although we dare say that a good A. and E. licensed mechanic could get a job quite readily in the ones that don't. Canada and Alaska are both good fields, although it would be unwise to tackle either one of them without previous contacts. If you want to try Alaska—and aren't too proud about what you do, you could go north from Seattle next spring and take your chances on getting some kind of a labor job when you reached Anchorage. Labor is scarce up there and a good man can almost always get something to do at good wages. Once there, you could look around and see what was doing in the aviation field.

Another angle—and this one may be the best—would be to get a job with Pan American. They ordinarily don't send green mechanics out of the country, so you probably would have to work up in their organization before you got a chance to leave the good old U. S. A.

Which reminds us—why the burning desire to leave our native soil. You won't find anything as good anywhere else that we know of. We've lived and worked in a number of foreign countries and although we still like to get out and do a little traveling every once in a while, personally we wouldn't trade half an acre of the Texas bad lands for all of any three foreign countries we've ever seen!

* * *

Several people have written in asking about jobs for pilots. Some of these are men who have washed out of Army or Navy flying schools and who have 200 or more hours. One man had just washed out of Pensacola on failure to qualify on dive-bombing. He had completed advanced training in navigation and radio.

The qualifications for CAA training, leading to a commercial rating, vary somewhat from the time to time, but the basic requirements are the ability to pass a Commercial physical, 180 hours of solo time and theoretical knowledge sufficient to pass the written test for a Commercial. The CAA also offers courses which lead to instructor's rating, with a good chance for employment as an instructor later. There are certain other special courses in instrument and cross-country flying. Age requirements vary with conditions and courses.

There is no reason why disqualification as a military pilot should stop anyone from becoming a commercial pilot if he wants to follow piloting as a career. The very factors that sometimes disqualify him are often an advantage in commercial flying. Furthermore, the Army has changed its policy as regards washed-out cadets and now is permitting many of them to take training as observers, navigators and bombardiers without sacrifice of their chances for a commission. We were unable to determine whether this applies to men who were washed out before the ruling went into effect, but it certainly wouldn't do such men any harm to apply to their regional Corps Area commander by letter, stating the extent of their cadet service and requesting appointment for further training. All Army correspondence should be mailed in duplicate. Where possible, the applicant's War Department file number should be given in the letter.

* * *

To return to the CAA thing, the best thing to do if you want such training and can fulfill the basic requirements is to have a talk with the CAA representacase to him and see what can be worked out. This advice applies only to pilots who have had 180 hours or more and who can pass the commercial physical. Beginners are bound by more rigid regulations.

END

# PERU Prepares with Taylorcrafts

To form the nucleus of a Civilian Pilot Training Program in Peru, ten 65 H. P. Taylorcrafts have been purchased by Liga Nacional De Aviation.

Alert to the vital preparedness value of *light* planes for primary training and multiplying flying experience, these patriotic South Americans are doing their part toward quickly creating "Nations of Pilots" throughout the Americas.

Peru's progressive defense program is highly significant.

FIRST—It is further recognition of the defense need and effectiveness of a systematic method for providing a great reservoir of pilots in our Western Hemisphere—a Civilian Pilot Training Program.

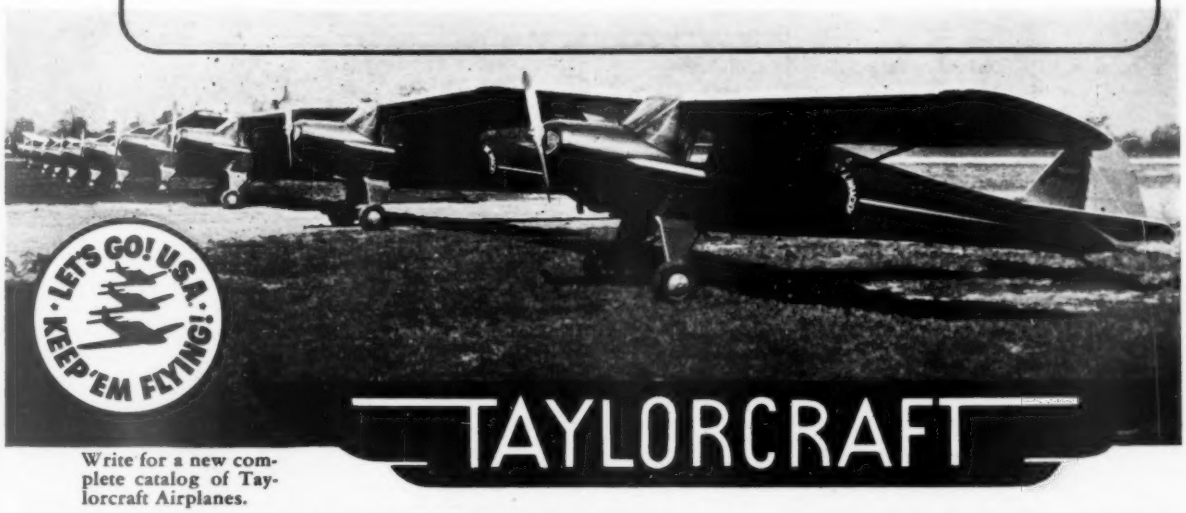
SECOND—It is additional evidence of the value and importance of *light* planes to successfully conduct such a program.

THIRD—It provides a cooperative basis to forward common defense aims and cement friendly relations with our Latin American neighbors.

Surely, along all fronts, the preparation for Hemisphere security moves ahead. We warmly congratulate the Republic of Peru and Liga Nacional De Aviation on the inauguration of their pilot training program with Taylorcrafts.

### For High Altitude Flying

Flying in Peru, a mountainous country, will be done at altitudes up to 8,000 and 9,000 feet. Taylorcraft has the proven ability to get up in these higher altitudes. It holds the World's light plane altitude record of 24,311 feet. Taylorcrafts will serve Peru well.

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**EXPORT: FAIRCHILD AVIATION CORP., JAMAICA, L. I., NEW YORK, U. S. A.**

## Octane Isn't Everything

(*Continued from page* 65)

and *be aware* that the engine is operating on it. Observe the precaution of watching temperatures, listening for detonation (indicated by knocking, overheating or roughness) and by using less horsepower than usual both in take off and in cruising.

Before touching the nozzle of the hose to your gas tank, ground the airplane to the nozzle with a piece of wire. Attach one end of the wire to the nozzle, and the other end to the tank. This will prevent a spark jumping and igniting the explodable mixture in your empty tank. If no wire can be obtained, touch the sides of the nozzle to the plane with the gas cap still screwed on tight. If there is any static electricity on plane or pump, the spark will not touch off the empty tank. It is an empty tank that is most dangerous, because the emptier the tank, the more air it contains and the better the mixture of gas and air; the more explosive it is. A gallon of gas mixed with air is about as powerful as 100 pounds of dynamite.

Next, obtain a clean chamois skin to strain the gas. This is neither old-fashioned nor a senseless precaution. Automobile gasoline does not have the temperature stability of aviation fuel because of the difference in operating conditions, as well as the variation in time of storage. For these reasons the copper dish gum in motor fuel is allowed to be as high as 50 mg. per 100 cc., while in aviation gasoline it is held to a maximum of 5 mg. Because of this fact, hoses used by automobile filling stations collect a serious residue of gum, and the cheaper the fuel, the more serious the residue. It is simple, for a sizable chunk to collect at the right time in the wrong place, causing a forced landing. The strainer should catch it, but why take the chance of fouling a carburetor jet? And perhaps getting it in the fuel tank, which is worse, as anybody who has cleaned one will vouchsafe.

In using the chamois, remember that it stops water, which is dangerous not only because it is non-combustible, but because it may freeze solid in the fuel line—thus forcing a landing. True enough, modern fuel pumps seldom pump water, but there is such a thing as condensation and rainfall . . . and the nozzles at the average filling station are usually pointed *upward*.

If there is no chamois available, do *not* use a substitute. Take a chance on the foreign matter, turn the engine up well on the ground, drain the water trap, and take off in as clear a space as possible. After getting home, drain the remainder of the auto fuel, and at the first sign of lean mixture or uneven runing have a licensed mechanic check the carburetor jets.

Suppose the attendant swears by his ancestors that the fuel he sells tests 73 octane. Does this mean that it will be okay in your Lycoming or Continental? Not at all. In the first place, knock rating (or octane) is controlled by a laboratory test, and for automobiles it is rated for use under the conditions of average driving. But this use is quite different from the continuous high-power output of an airplane engine. It has been found that some types of automobile fuel do not maintain their anti-knock characteristics when used in aircraft engines because the conditions are more severe. The result is detonation, even though the laboratory octane number of the auto fuel is the same as that specified for the airplane engine.

What is the result? Poor take-off performance, detonation, overheating, and possibly engine failure. In any event it will mean curtailment of engine life, and that operation during the remainder of its useful period will be less efficient, less safe, and less satisfying.

What should one do if forced to use such fuel? First, take off from a position that will not call for full throttle. Then fly at reduced throttle, being especially alert for indications of detonation, such as overheating, rough operation, or audible knocking. At half throttle or less, the engine is not so apt to suffer.

There are other reasons for not using automobile fuels, and one of these is the vapor lock hazard. The Reid vapor pressure specifications for motor gasoline vary from seven to 13 pounds per square inch, depending upon the season and prevailing temperatures. It is common practice to maintain a high vapor pressure to reduce starting troubles, so that at sea level an automobile engine can be started readily.

But what happens when such fuel is put into an aircraft engine—or, for that matter, the automobile is taken to a high altitude? A decrease in atmospheric pressure will cause fuel to boil at a lower temperature, vaporize more readily, and form a vapor lock. Aviation gasoline, on the other hand, is maintained always at the lower figure—seven pounds per square inch—and therefore will not cause vapor lock under normal conditions, even at high altitudes.

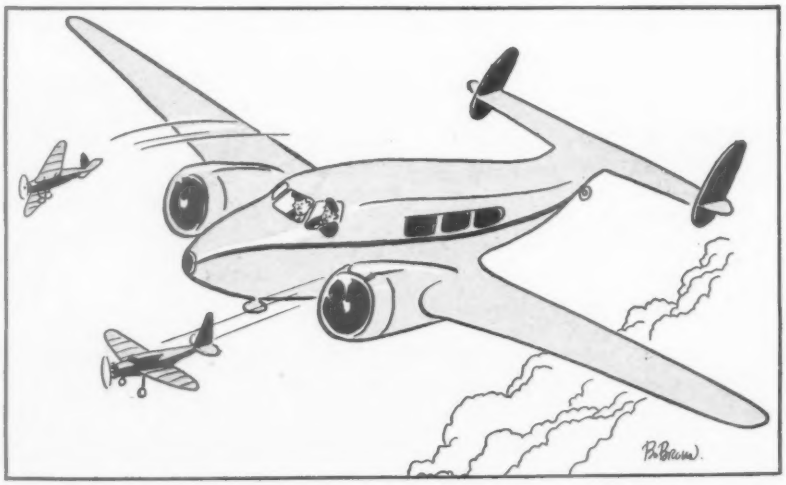
The remedy for this is to fly at a low altitude, although not so low that a forced landing would be embarrassing. Hops over mountains should be avoided at all costs—in fact, the sooner the gas can be drained and a good aviation fuel substituted, the better for the pilot's health and aviation's safety record.

Finally, there is the fact that the distillation characteristics of motor gasoline are not controlled closely enough to be acceptable for aviation purposes. Aviation gasoline is specified as 270° maximum, while motor fuels vary from 300° to 365°. If the carburetor jets have been selected for an aviation fuel, and a cruder, heavier, less-volatile brand of gas experimented with, poorer performance certainly would result. This might be evidenced by overheating, excessive fuel consumption, failure of engine to turn up rated r.p.m. (and consequently less horsepower), improper mixture leading to burning of valves, excessive carbon deposits causing fouled plugs, and eventually a forced landing.

Some pilots will claim that the practices condemned by others are the very methods they have used successfully for years. Let no one be misled by the *octane rating number:* it means very little without the entire story. It makes no difference if the octane is 100 and the fuel contains gum, a high-pressure value, a knock rating designed for low temperature—low horsepower output, and a high distillation characteristic, because regardless of the 100-octane rating, the fuel will not agree with the horses in the engine. Eventually, they will organize and go on strike.

No pilot wants to fly a plane that is going to let him down, literally or figuratively. A little investigation usually reveals that planes using inferior fuels require more attention, more overhauls, and are more expensive to keep up. No pilot has ever lost by paying attention to details and for following scrupulously recommended practices.

END



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INTERSTATE *Cadet* FOR 1942

# INDUSTRY ITEMS

The Federal Communications Commission has granted Air Associates, Inc., permission to construct and operate a new Class I radio station using call letters W6XFY, as well as a license for an experimental portable radio station — call letters W10XOF — on aircraft. The experimental station will be erected at the company's California plant. W. S. Van Dyke, Air Associates' radio division manager, says the experimental station is designed to carry on the company's research and development program into the field of ultra-high frequency aeronautical radio equipment and direction finders.

Soft latex cups to relieve radio headphones' pressure on pilots' ears have been designed by Ray W. Brown, manager of General Tire and Rubber Company's aviation department, Dayton, O. He reports they cushion the hard rubber of the phones, yet will not chafe ears or head.

An honorary Doctor of Engineering degree for "meritorious contributions and outstanding advances in the fields of engineering and science" has been conferred upon Ralph S. Damon, Republic Aviation Corp. president, by Clarkson College of Technology, Potsdam, N. Y.

Siloo Penetrant, a safe solvent for motor, carburetor and ignition work, is being introduced into the aviation field by its makers, Petroleum Solvents Corp., 331 Madison Ave., N. Y. C. It also acts as a rust and gum inhibitor and remover. A non-conductor, it will not arc points, the manufacturers say.

A new single arm, ball bearing, swivel tailwheel assembly requiring lubrication only four times yearly has been announced by the Heath Co., Benton Harbor, Mich. It is reported as the first such unit for lightplanes.

Heath tailwheel.

Two holes are drilled simultaneously with a novel portable drill designed by Desoutter Brothers, Ltd., London, England, for aircraft work. A pneumatic motor powers the unit, which weighs only two pounds.

Non-shattering and resistant to pitting is a new type lens material developed for use in industrial goggles by the Univis Lens Co., Dayton, O., under the trade name of Tulca lenses.

Production of special glare-protection aviation goggles has been increased 1,000 per cent by the national defense program, reports the American Optical Co., Southbridge, Mass.

Particularly applicable to aircraft construction use is Weldwood Waterproof Glue, a plastic resin and the first one-part, cold-setting plastic adhesive ever devised, state the Plaskon Co., Inc., its manufacturers. Distributing the product is the United States Plywood Corp., N. Y. C. The glue has been approved by the CAA, Navy Department and Bureau of Aeronautics.

Successful aluminum production at Muscle Shoals, Ala., has been announced by Reynolds Metals Co., following test runs at the firm's new Lister, Ala., plant, which produces alumina from bauxite, then reduces the alumina to pure aluminum. At full production the unit will turn out 40,000,000 pounds of the metal yearly. Another new smelter with a 60,000,000-pound capacity is being erected at Longview, Wash.

Four defense orders for Douglas, Boeing and Vultee were completed from five to 12 weeks ahead of schedule recently, McDonnell Aircraft Corp., Robertson, Mo., reports. They consisted of parts and sub-assemblies.

Ten thousand 400-watt mercury-vapor lamps and approximately 15,000 fluorescent lamps will light the new decentralized, windowless "blackout" Douglas plant at Long Beach, Cal., reports the Westinghouse Lamp Division, Bloomfield, N. J. Lighting load for the 11-building factory will total about 5,000 kilowatts. The plant will include more than 1,000,000 square feet of manufacturing area.

Appointment of Virgil Simmons as director of training for Spartan School of Aeronautics' civil flight school has been announced by Capt. Maxwell W. Balfour, Spartan director. Spartan is located at Tulsa, Okla. Mr. Simmons is best known as the author of "Air Piloting," a flight instruction manual.

A modernized Willard electrical check, the WD-2, for testing automotive electrical systems, has been put on the market by the Willard Storage Battery Co., Cleveland, O. With it the test circuit is completed through a single hookup. Another new Willard device is the charge preserver, a completely automatic unit for putting a continuous, low-rate charge (approximately 100 milliamperes) into one or more batteries simultaneously.

Safe-Flite Instrument Co., Seattle, Wash., has developed a new flight computer to enable pilots to formulate flight plans based on visual checking of flight chart markings.

The instrument is set to the ground speed and is placed on the standard aeronautical chart along the route flown. It indicates the time the aircraft passes over landmarks or radio check points. Two models are made. They provide computations for all aircraft with speeds up to 400 m.p.h. The instrument is 13½ inches long and 1¼ inches wide, with fixed distance scales conforming with aeronautical chart scales. It has a movable expanding time scale to provide time-distance ratio.

Mead Specialties Co., 15 S. Market St., Chicago, have introduced a new tool—known as the "Bandsander"—which carves, shapes, sands and polishes wood, plastic and metal. They report it especially valuable to pattern makers, hobbyists and other detail workers.

Charles A. Arens, president of Arens Controls, Inc., 2250 S. Halsted St., Chicago, now is acting as the firm's sales manager, in addition to his designing and developmental activities. Calhoun Norton, continuing as vice president, has been appointed general manager. Richard Frost, a graduate of Rensselaer Polytechnic and formerly Pan American Airways' maintenance engineer at Brownsville, Tex., becomes the new chief engineer.

A 50,000-pound Olsen hydraulic tensile testing machine and a large radial have been installed by the Casey Jones School of Aeronautics, Inc., 1100 Raymond Blvd., Newark, N. J., so that students may learn the technique of testing strength of welds, riveted joints and metals and of precision-tool use.

Appointment of Robert S. Furst as personnel director of Adel Precision Products Corp., Burbank, Cal., has been announced by H. Ray Ellinwood, the firm's president. The appointment is coincident with the signing of a "no strike" contract between the Precision Employees Association (an independent union) and Adel's.

A new portable acetylene generator for use in oxy-acetylene welding and cutting has been announced by the Linde Air Products Co., 30 E. 42nd St., N. Y., a unit of Union Carbide and Carbon Corp. Known as the Oxweld MP-10, it will deliver 30 cubic feet of acetylene per hour. It is suitable for welding metal up to ⅜-inch thick and for cutting steel up to 5 inches thick.

Dr. T. D. Phillips, formerly head of Marietta, O., College's physics department, has joined the faculty of Miami's Embry-Riddle School of Aviation, John Paul Riddle, president, announces. Dr. Phillips, who will teach ground school work and act as consultant, was one of the nine men called in by the Government to write the CPTP's textbooks. He also prepared the "Digest of Civil Air Regulations."

Aircraft voltmeters and ammeters designed and rated to Government and commercial specifications are described in a new seven-page bulletin announced by Westinghouse Electric and Manufacturing Co. All features are discussed. A copy of catalog section 42-347 may be secured from the company's department 7-N-20, E. Pittsburgh, Pa.

James A. Lane has succeeded G. A. Theobald as production director of Aircraft Accessories Corporation's Burbank, Cal., plant. The firm also has opened a wholly owned subsidiary factory with 40,542 square feet of floorspace at Kansas City, Kan. The subsidiary will specialize in Government priority orders.

A new thermostat for liquid-cooled aircraft engines has been developed by the Fulton Sylphon Co., Knoxville, Tenn., subsidiary of the Reynolds Metals Co.

The first large scale contract for a newly perfected electrically-heated flying suit to keep aviators warm at high altitudes has been awarded to the General Electric Co., Bridgeport, Conn., by the U. S. Army Air Corps. The largest single order ever received by the company's appliance and merchandise department, it calls for 12,000 suits. The suit, wired throughout, is designed to keep an aviator comfortable through a 130° temperature range, from 70° above zero to 60° below. Electrically-supplied heat is adjustable. The new suits are many pounds lighter than the sheepskin-lined garments they replace.

Aeroquip Corp., Jackson, Mich., has adopted a group program providing $52,000 insurance for its employees. The plan is underwritten by the Metropolitan Life Insurance Co. Employees and employer each contribute fixed amounts to the net cost. Individual workers receive from $500 to $1,000 life insurance and hospitalization for sickness.

Fleetwings, Inc., Briston, Pa., is inaugurating a cooperative group insurance plan for its employees. The program provides life insurance, weekly accident benefits, weekly sickness benefits, daily hospital benefits and special hospital benefits.

Designed for driving 5/32-inch soft iron and 3/16-inch aluminum rivets, the new 3Z Thor extra light pneumatic riveting hammer has been developed by the Independent Pneumatic Tool Co., Chicago. It has a ⅜-inch bore and 3-inch stroke and is available in five handle styles. The new hammer is a "slow-hitting" type, aimed to eliminate leakage or loss of power.

Two new airplane tires that make possible high speed landings and take-offs with fast fighter planes from soggy ground have been developed by Firestone Tire & Rubber Co., Akron, O. Revolutionary in design, one is a landing tire with a flat, wide tread extending nearly to its sidewalls and reinforced with rubber ribs or buttresses. The other is a new type, low profile nosewheel tire mounted on a special wide-flanged wheel to allow landing despite puncture by gunfire.

The Sperry Gyroscope Co. is erecting a new plant with 1,350,000 square feet of floor space near Great Neck, Long Island, not far from New York's LaGuardia Airport. On completion early in 1942, it will employ approximately 7,000 men to help meet the demand for more precision instruments for U. S. warplanes.

A new heavy duty sander, designed by the Black & Decker Manufacturing Co., Towson, Md., has a 9-inch abrasive disc which covers a larger area than any production sander previously offered. It features a spindle lock for quick disc changing.

END

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CULVER AIRCRAFT CORP.

CONTRACTORS TO THE U. S. ARMY AIR CORPS

CULVER AIRPORT

WICHITA, KANSAS, U. S. A.

## I Learned About . . .

(*Continued from page 56*)

blur and a patch of bright light that hurt my eye terribly. Sea and sky. I kept the nose on the dark line. Perhaps, if I could fly around for a while, the tears would wash whatever was in my eyes toward the corners and I could see a little.

The right eye cleared up a bit, but I had to keep blinking it. After a time the other eye opened up. I couldn't see any better, immediately. The sound of another motor very close by awakened me to my true predicament. I had, thus far, been able only to regain control of the ship. That must have been another plane.

Where was I flying? In what direction? Had the ship I heard been Paul's or Alberto's? I knew that there were plenty of other ships in the air around the airdrome. Then I really got scared. Should I bail out? No. I couldn't do that, but how in heaven would I ever get down?

Again, there was the sound of a motor, then another close after the first. I saw a fleeting, dark blur over my ship's nose. Didn't know it then, of course, but Paul and Alberto were circling around me wondering if I had suddenly gone crazy. Yes, I could see a little better, except that the light hurt so. There was only one answer—time.

Gradually, ever so gradually, my vision became clearer. Eyes felt dry now that there were not so many tears, but I could see a little. I banked around, put the sun behind me. I knew that we had been southeast of the airdrome and that the sun was somewhere between southeast and east. Surely this heading would bring me somewhere near to La Ribera.

After what seemed like a long time—it couldn't have been more than five minutes or so—I passed over the coast far above the town and airdrome. I turned and followed the beach and eased down into a glide. Two Caudrons were flying along just above mine and to one side. It just then occurred to me, Paul and Alberto, couldn't quite make out the numbers of the ships. One of them was waving.

So long as I didn't look at the southeast horizon I was able to see fairly well now. I was certain that I could land. That was until I circled the airdrome and saw the position of gently flapping *manga* and flags. The wind was the same as when we had taken off, which meant that I would be landing smack into the sun as well as into the wind.

I circled low twice more before making up my mind. I could see so long as I didn't look near the sun. It had to be either cross-wind or downwind. I chose cross. The Caudron landed hot in a stiff breeze, and a downwind landing with my burning, uncertain eyes would have been an unpleasant sight to watch. I took a deep breath and swung around, going way back of the field. I eased the ship down, maintaining a few revs since the Caudron must be dragged in like a pursuit, and said a quick prayer.

I was almost down—or so it appeared—before I cut the gun. I brought the tail down a little too quickly and she started up again. But I gunned the engine in time to keep from pancaking completely. That Caudron gave up and plopped down plenty hard.

The first thing Paul said was, "What the hell bit you, fellow?" Then he saw my eyes. Next he wanted to know how it happened. The car careened across the sandy loam of the field—some of which was the "dust" in my eyes—toward the hospital building. The medico took three grains of what he said was sand out of the left eye and two out the right. He put some kind of medicine therein and I wore bandages over both for two days—48 hours of darkness in which I had ample time to think.

It was my fault as much as that of my mechanics. I should have made certain that the ship was *clean inside as well as out*, so should they. A little dirt on the floor came just about as close to putting me away as any of the fascists ever did. Believe me, F & PA readers, any ship I ever leave earth in is going to be plenty spic and span under foot; and, on second thought, there's nothing exactly wrong about keeping one's goggles where they belong either.

END


No dull, futureless job for me... I'm getting into *Airline Maintenance*

Photograph courtesy Transcontinental and Western Air, Inc.

That's what many ambitious young men are telling us nowadays here at Aero ITI. They have heard all about the "quickie" training that makes you a riveter, machine operator, or some other type of rank and file employee. They say that's alright for a fellow who wants "just a job" and isn't counting too much on staying in Aviation. But as for themselves, why they're looking at how big the airlines are right today . . . and how many, many times bigger commercial aviation is *going* to be. Naturally, they're counting on the big thrill of keeping great airliners in flying trim . . . but it's the better pay, security, big future, and broad opportunity that counts most with them. ★ These future airline maintenance men are coming to Aero ITI because it's an outstanding school . . . a really big school where they can have every facility, every opportunity, to achieve the skill, to gain the knowledge, necessary to success. Find out—as they did—all about the great future in airline maintenance . . . and how Aero ITI training can make that great future come true. Send the coupon NOW.

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# THE BULLETIN BOARD

## FLIGHTS

| | |
|---|---|
| Oct. 18 | Notre Dame Carnegie-Tech football flight. Tour of Carnegie-Tech Aviation class rooms. Pittsburgh, Pa. Director, Harry Brainerd.* |
| Oct. 19 | Breakfast flight, Mattoon Airport, Mattoon, Ill., sponsored by the Association of Commerce.* |
| Oct. 19 | Breakfast flight, AOPA Baltimore Unit. Baltimore, Md., airport.* |

## CONVENTIONS

| | |
|---|---|
| Oct. 12-15 | American Society of Mechanical Engineers, fall meeting, Louisville, Ky. |
| Oct. 20-24 | National Metal Congress and Exposition, Convention Hall and Commercial Museum, Philadelphia, Pa. |
| Oct. 30-Nov. 1 | SAE National Aircraft Production. Biltmore Hotel, Los Angeles, Cal. |
| Oct. 31-Nov. 2 | Aero Medical Assn. annual convention. Statler Hotel, Boston, Mass. |
| Oct. 30 Nov. 1 | Conference on Airport Construction, operation, maintenance sponsored by Illinois Institute of Technology. Palmer House, Chicago, Ill. |
| Nov. 13-14 | SAE National Transportation and maintenance meeting. San Francisco, Cal. |

* AOPA flight

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# America Plays Its Part in the Chinese Air Force

(*Continued from page 20*)

1932 by Generalissimo Chiang Kai-shek. He was retained, together with 15 American instructors, to set up a real military air force. Things began to improve. Standardized equipment was purchased, and a "West Point of the Air" was built at Hangchow. An effort was made to consolidate the many provincial air services in one central air force—that of Chiang's government in Nanking. The northern provinces fell in line, but the southern —Kwangtung and Kwangsi—kept their own independent flying outfits. By 1936, Chiang Kai-shek had a good air force and the position of the independent provincial outfit of Kwangsi became hopeless, though it did continue in existence until the outbreak of the Sino-Japanese war.

Colonel Jouett's mission terminated in 1935. This proved to be a calamity for China. Even as in 1912, the Chinese again turned to the Italians for help. However, the Italians did not treat them well, but delivered to the Chinese their most inferior types of aircraft. Jouett had encouraged the establishment of their own aircraft factories and China actually was producing at the rate of 200 planes per year (less motors). There was no separate naval air force, nor army air force; all aviation was under one head, but it had more different types when the war broke out than any other three nations in the whole world. Heinkels of all breeds, Vought *Corsairs*, Boeings, Armstrong Whitworth, Junkers, Bristol *Bulldogs*, Bredas, Northrops, Martins, Vultees, Savoia Marchetti S-72's and Fiat BR-3's. The training planes presented a picture almost equally as bad: Fleets, Douglas 0-38, Focke-Wulfe, Breda, Bristols, Avros and Bellancas. Not more than 15 per cent of the planes were serviceable at any one time and not more than 300 could ever have been made to fly. Even the fuels and oils were legion.

In justice to China it must be stated that, despite this burlesque of modern air warfare, the training of pilots and mechanics was generally good. Of all the conflict of policy and the seething struggle between the British, Italian and American missions for control, Jouett's work was undoubtedly the foundation of the future Chinese air force. Yet China had not had sufficient time to build on this foundation—and, as a result, when the war with Japan started, China entered the conflict with about 600 obsolescent aircraft. Japan, on the other hand, had 1,003 first-line planes in her army air force and 1,708 in that of her navy.

From the very beginning of the Sino-Japanese conflict, the Chinese air force was overwhemingly outnumbered. The Chinese themselves realized this and decided to waste no planes combating Japanese attackers. "Let 'em bomb," they said. "Let them waste their explosives, valuable metal, gas and ships on Chinese targets; they are of only slight significance. We'll live to fight another day!"

It must be remembered that China is far from industrialized. The Japanese could single out few targets, the pulverizing of which would give China's war-making power any sizable set-back. The Japanese, on the other hand, soon realized this and gave themselves over wholly to the terrorizing of the Chinese people. The air war in eastern Asia became a gigantic slaughter of Chinese civilians by the Bombers and machine-gunners of Nippon's air force.

"Well, Ensign Dinwiddie! Where have you been?"

The Chinese air force, however, did not stand idly by. The Chinese pilot is brave; he is bold and he is daring, he is patriotic and sincere. Unlike some more prominent European flyers of today, he is chivalrous but not rash; in an attack he is precipitous, without being foolhardy.

In spite of the numerical insignificance of the Chinese air force, the Chinese pilot often struck back, much to the surprise of aggressor Japan. Raid after raid, most of them quite unexpected, started in 1938. They struck absolute terror in the breasts of the Japanese airmen, who burned with mortification over their injuries at the hands of China's air force, which had been pronounced non-existent.

In February, 1938, the Chinese won their first major air victory over the Japanese, when they engaged them over the Wu-Han area in a surprise attack. They used 11 new Russian biplanes, Type E-15-3, and 19 monoplanes, Type E-16-3 —all flown by Chinese pilots.

A second surprise attack was carried out on the Japanese air force over the Hankow area on April 29, 1938. This time the Chinese employed 67 pursuit planes—in fact about all of China's available planes of this type. Most of them were Russian planes, with a sprinkling of Curtiss *Hawks*. Forty of the planes were piloted by Chinese and the remainder by Russians.

Two other raids were carried out with great success on October 3 and 14 of the following year. This time the Japanese were in possession of the great river port of Hankow and had a concentration of about 300 planes on nearby airfields. On each occasion the Chinese came in without the slightest warning and used Russian bombers to destroy one-third of the Japanese planes grounded in close formation. More than 200 Japanese pilots and mechanics were killed or wounded and large quantities of gasoline and ammunition were destroyed.

Numerous other Chinese raids on Japanese air bases were carried out to the glory and credit of a small air force which —if it wished even to exist as a mere nucleus—had to conserve itself for just such missions as it could accomplish without danger of annihilation and yet with the greatest possible damage to the Japanese. Of such missions, one was the sensational flight of two Martin bombers on a "pamphlet" raid over Japan on the night of May 19-20, 1938. Although no bombs were dropped, the Chinese flight demonstrated the lack of anti-aircraft defense by Japan and the terrific vulnerability of cities in Japan proper. Another Chinese air sortie beyond the national boundaries of China was the raid on Formosa, on February 23, 1938. Again the Japanese were taken by surprise and 12 of their grounded planes were destroyed by bombing.

By the end of 1940, the Chinese air force was once more reduced to a minimum of 90 planes of combat type—and half of these were undergoing repairs. The need for more planes was once more urgent and Russia started to supply China with a number of excellent machines. About 75 E-15-3's, capable of 260 m.p.h., were delivered first. Soon after, a similar number of E-16-3's, capable of 300 m.p.h. and 100 twin-engined monoplanes, type SB, capable of 280 m.p.h., were flown into northwestern China from Soviet Russia.

The problem of procurement in the Chinese air force is entirely one of purchase from abroad. The little that is done in the manufacture of aircraft is largely the assembly of imported parts. The Chinese have purchased heavily from abroad, but they have not always been successful. Because of their lack of experience in matters of aviation, they were forced to rely on foreigners. These foreigners were either advisers or salesmen; the former, for the most part, gave good advice but it was not always followed.

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The latter were chiefly interested in their sales commissions and had little or no interest in building up a serviceable air force for China.

Throughout 1940, however, China was slowly rebuilding her air force personnel. Planes were scarce but pilots were being turned out in ever-increasing numbers. The problem of aviation gasoline was such as to render a sizeable Chinese air force useless, had one existed, for the capacity of the Burma Road was taxed to its utmost.

Toward the end of last year, the Chinese air force, as a fighting force, was virtually non-existent. There were probably not over 30 combat planes available in all of Chiang Kai-shek's China. The Chinese turned frantically again to Russia for planes, asking for newer models than the E-16's, as even these had proved inferior to Japan's latest pursuit plane. The Japanese had suddenly appeared over Chungking in single-engined, low-winged monoplanes, so fast and so maneuverable that something better than the Russian E-16's would have to be procured. The upshot was that the Chungking government turned to the United States in a final attempt to obtain effective air aid against Japan. This call for help reached the ears of our Government at a moment when Japan's threatened southward move loomed so large that our concern over Singapore almost became one of national defense significance.

An American air mission, consisting of Brig. Gen. H. B. Clagett and Col. H. H. George, both of the U. S. Army (in the Philippines) and Comm. E. O. McDonnell of the U. S. Naval Reserve, arrived in China about the middle of May of this year. Its purpose was to study the seriousness and the needs of the Chinese aviation situation and to report to this Government its findings and recommendations. The essence of its report was to the effect that while China needed combat planes, and the supply of such planes was recommended, it was considered wise to turn over only a portion of the new equipment to the Chinese air force. The rest was to be handled by an American-managed mission in China made up of volunteer American pilots. This decision was partly based on the fact that the defense measures of the Chinese air force had for almost a year been of a passive nature. The resultant psychology of its airmen would not make for a high standard of aggressiveness immediately upon the delivery of new equipment and it was feared that without some simultaneous stimulant in Chinese air morale, through the medium of daily contact with exemplary standards, initial losses in aircraft would be too great.

It is believed that the decision to have American volunteer pilots fly American planes in China was also partly due to this Government's desire to test its planes, as the Germans and Russians did over the battlefields of Spain. Another reason was the desire of the democracies to menace Japan sufficiently in China to keep her forces there and to demonstrate the futility of any northward or southward movements by the Mikado's soldiers and sailors.

Thus we find once more a Chinese air force in the pangs of rebirth. Streaming into China, through Rangoon in Burma, are pilots and planes. Before the end of August, almost 200 American pilots had reached Rangoon and were busy testing a hundred P-40's before taking up their strategic posts in the heart of vast, unconquerable China. Hundreds of other planes are being unpacked at Rangoon, Vultee *Vanguards* and Curtiss P-40's, the latter equipped with Allison liquid-cooled engines and both light and heavy machine-guns. By the end of this year China will once more have an air force of roughly 500 combat planes of the latest and most effective types. Working incessantly for such achievement are T. V. Soong, now in Washington as head of China's Lend-Lease Commission; and General Mao Pang-chu, chief of China's air force in Chungking.

It is the author's firm conviction that the new air force will be formidable. After all, the shortcomings to date have been those of materiel and organization. No one can *gainsay* the claim that Chinese ingenuity is great. Mechanics and pilots alike are above average.

In the field of signalling and radio communications between one plane and another, or between planes in the air and cooperating ground forces, the Chinese air force has made great strides. It seems that not so very long ago, the Chinese were still obliged to rely on a crude system of signalling between plane and ground. In the early days of the Manchurian air force, for instance, an excellent, though very primitive system had been worked out. A squadron leader flying over his own forces—especially during operations against Chinese irregulars—often made the mistake of bombing his own forces. In such instances it was imperative that the squadron leader be given a clear signal from the ground indicating the direction in which the opposing forces could be found. This was accomplished by the commander of the ground forces ordering a number of his soldiers to lie down on the ground in the formation of an arrow pointing in the direction of the enemy, with another group of men forming a Chinese character for the number of li (one-third of a mile) between the commander and the enemy. If any further message were to be communicated, a large sack of flour was punctured, and a soldier would write over the fields a huge character which could be read from a height of almost 5,000 feet in the air.

Today, China's aircraft are equipped with complete two-way radio, ultra-modern type, and a direction finder equal to any in the world.

As for the pilot personnel, they have demonstrated completely their worth. Much has been said for and against the Chinese as aviators. Those who have condemned them have not given consideration to the materiel shortcomings, such as the many models, shortage of spares, lack of regular fuel supplies, poor airports, non-existent runways and lack of transport facilities. Chinese pilots have demonstrated that they are A-1 air fight-


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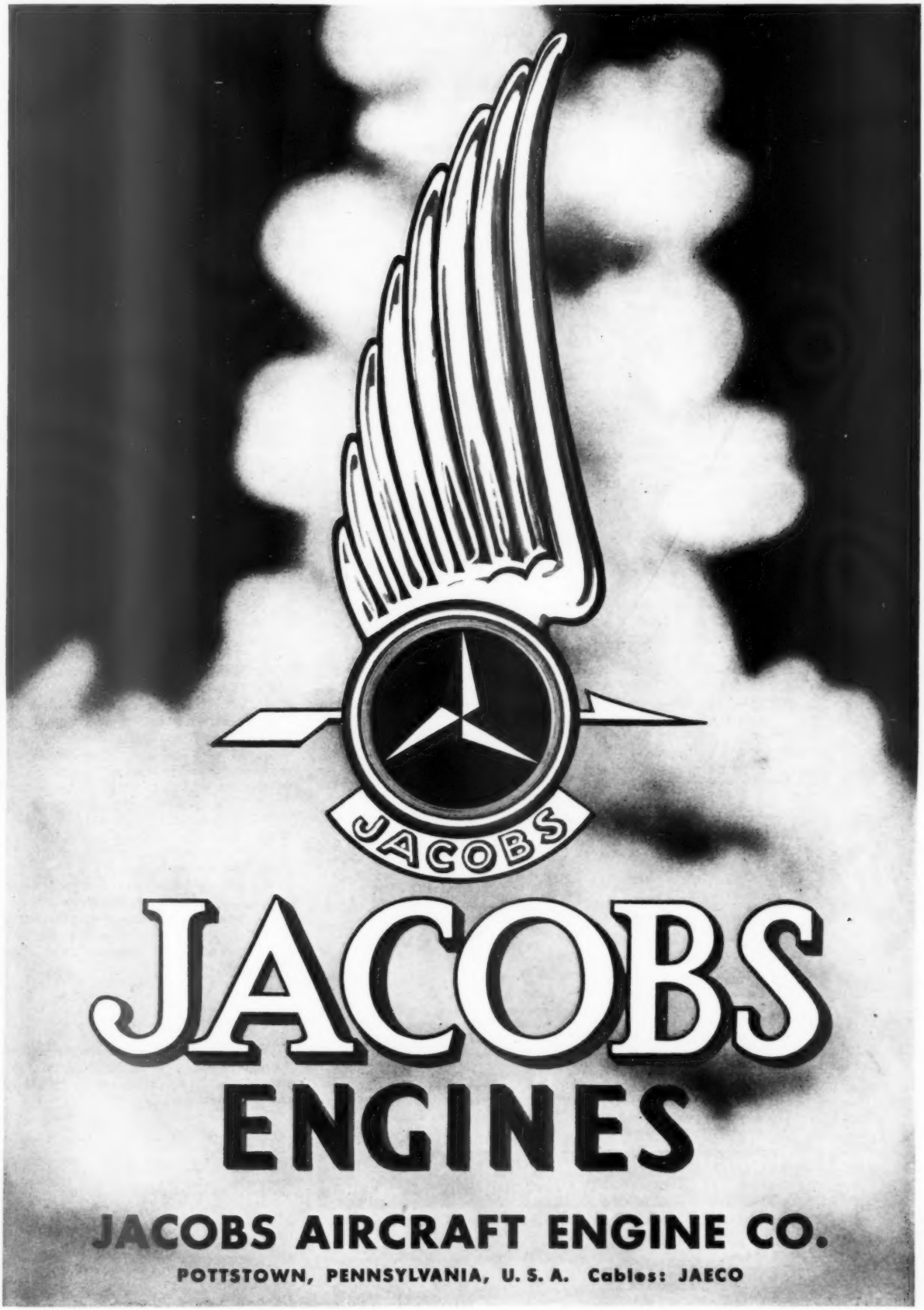
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ers. There are such heroes as Sheng Tsung-hui, who sank a Japanese warship in Hangchow Bay, diving precipitously through an anti-aircraft barrage and crashing his bomb-laden plane on her deck.

And China, in her short struggle, already has her own Frank Luke, Jr. Like our fearless balloon buster, Yuan Hsi-wen landed behind Japanese lines and shot it out before he took his own life rather than surrender. Last, but not least, China has her Wilbur White—Chen Hwai-min, who rammed his plane against a Japanese fighter rather than give up when his guns jammed. Long shall their memories live in the history of flying in Asia—and, with the aid of their successors, in better planes, their sacrifice shall not be in vain.

END

## Black Water

(*Continued from page 70*)

tude and outside. Two miles northwest, the Corry Field landing lights throw a broad glow for Squadrons Five and Two. Boeing fighters, F4B-4's, up in nine-plane formation, move steadily across the sky. Their pinpoint wing lights merge in a cluster or break apart as they change position.

Then the turtleback on your lead plane flashes again, winking the signal to close in. You open the throttle and overtake him, sliding again into position. Back from the exhaust of the other wing plane coming in, a plume of bright blue flame flares and steadies again as the pilot changes throttle setting. A signal for left echelon and you hold your position close in and steady while number three crosses over. Then you nose down, following toward your landing area in the short course.

Your formation hour is up and you're tired and cramped. The soles of your feet have had a bad case of hot spots for 30 minutes and you ease your insteps up on the rudder bars. But that's too clumsy. You shift position and fly awhile with your left hand on the stick.

Then the long finger of the duty officer's searchlight sweeps the bay—your signal to come in. You follow down to 1,000 and start a gentle left turn until you get a green signal from the beach. Then you ease off throttle to drop to 500 feet into the landing circle.

You have little time to watch scenery now. There ought to be six planes here and you hunt them out. Your own section's airplanes are easily located but you search a full minute before you find the other three. Then you see their red wing lights as they circle in a left turn.

Then you suddenly notice the moon's behind a cloud. Gone is the yellow light that rippled across the bay, showing the surface for your take-off. Through the struts and wires of your right wings, the myriad red obstacle lights and the street lamps or the air station jump into brilliance as you turn into the wind. Ahead and on the right, as you square away upwind at 200 feet, are two white surface lights showing the windline. But the water around them is black—black and featureless. To miss the slipstream of the plane ahead you choose a spot far to the left of the lights—so they won't be close enough to help.

You have a premonition of a sudden ducking and you gulp a hasty swallow throttle down your engine r.p.m. to 1,250 to 1,300 and hold it there. Up comes the nose, slowing your glide to near stalling and you feel her begin to settle in beneath you. Impossible to tell where the surface is. But you've got to hit it safely in a landing position.

A quick glance out the right side now and then, to check your heading. For the rest, no use looking. Water's there, but you can't distinguish it. You sit and wait and drop steadily. Watch the tachometer. Watch the airspeed. Feel what she's doing by the seat of your pants. Altimeter says 125 feet now—100—75—and keep dropping. Is it accurate, after you set it an hour or more ago? Maybe it's off 5 feet! Which way, up or down?

There go the lights, gliding by on your right. You're near their level, but still high. The engine purrs on. You keep your hand tense but easy on the stick. Juggle it lightly, gently, feel the wing out. Well above a stall. Steady, now. The lights are past. You are almost on!

Suddenly the seat sinks under you. Air speed's too low! Fifty-five knots! Open the throttle to catch it. She stops settling so fast. And then, gently, smack!—swish—ee—eee—goes the float and you're on!

You'd cut the gun now for a normal landing. But this is practice so you open the throttle wide again and hold the nose right there. She lifts and drops again, lifts, settles back, stays on and you feel the drag of water on the float. The plane's alive and she feels the lift of wind across her wings. Every strut and wire strain to be in the air. Then a last, gentle jolt and you feel her rise, air borne again, back where she belongs.

You've made the first one alone! And not too badly. Overshot a lot, but it was safe. You'll correct the next one.

Then comes the white light from the beach and you land for the last time and cut your gun and wait for a signal to come in under the crane and be hoisted "aboard." On the herringbone curve of your wake, moonlight rolls and glistens. The silhouette of the last plane settles on. Then, ahead, the signalman gives you a green light. You open the throttle and roar in, steering directly for it. Spray rises in the prop and is whipped back over you, cool and wet. You slow down, then cut the throttle, as you approach the beach and the green light turns to red. There goes the float, scraping gently as you've lost speed. Three men in bathing trunks take the wing tip and, with their help and the engine's, you pull under the crane and cut the switch.

The crane man hoists you up and drops your plane gently onto its dolly and you climb down into a hustle of activity as the crews push your ship away. Tomorrow, 90 minutes of new time on your log—night solo.

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| Student glider pilot certificates | 528 | 426 |
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| Certificated aircraft | 22,829 | 14,940 |
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| Certificated gliders | 56 | 35 |
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## Stability

(*Continued from page 71*)

to its neutrality. If the pilot puts the airplane into some maneuver apart from level flight (such as a nominal dive) the airplane will continue in this state unchanged. The maneuver is neither increased or decreased in magnitude.

Now, before anything can be determined about the dynamic stability characteristics of an airplane, the oscillations due to static stability must first be set up. Dynamic stability is concerned with those oscillations which are set up in the force system as a result of the restoring forces. If the dampening forces are properly related to the restoring forces, the airplane will be stable dynamically. If not, it will be neutral or unstable. This leads us then, directly into a discussion of the three types of dynamic stability.

The determination of the dynamic stability characteristics of an airplane, from a model of that plane in the wind tunnel, is a long and tedious job. In most cases the designer attempts to get the best possible qualities of static stability and then trusts that the dynamic stability will be proper. With the size airplanes which are generally being built today, the pilot has little difficulty in stopping any oscillations which might occur by the use of the control surfaces. However, as larger and larger airplanes are built the necessity for a complete investigation of the dynamic stability characteristics will become more apparent. In fact, in airplanes as large as some of the present transoceanic clippers, such an investigation—if only of a mathematical nature—has become urgent.

In dynamic stability the oscillations set up by the static conditions will be gradually and completely dampened out until the airplane is once more in a horizontal path. A glance at Figure 4 will serve to clarify the condition of dynamic stability. Any pilot flying his own airplane, can very easily determine the dynamic stability characteristics of that airplane. It is done in this manner:

Flving the airplane at a constant altitude, in level flight at a constant air speed, gently push the control stick forward until the airplane goes into a shallow descent. Continue in this attitude of flight until the airplane has increased in forward velocity by some predetermined value, say 25 m.p.h. over that speed which was just maintained in level flight. Then take all hands off the controls and allow the ship to re-assume level flight of its own accord. Take careful notes of the changes in airspeed each four or five seconds. As the airplane oscillates up and down to regain level flight, the air speed will alternately increase and decrease until it reaches its original constant value, which will indicate that the airplane is again in level flight.

After the flight tests are over, plot a chart which shows the changes in air speed against the time in seconds. The graph will appear essentially as the one shown in Figure 4, except that it will have definite values of magnitude. It will show exactly how many oscillations the airplane required to regain level flight and the magnitude of the greatest oscillation.

If an airplane possesses the desired amount of dynamic longitudinal stability, regardless of its size, it should regain level flight, after being displaced quite severely, in a maximum of two oscillations. The author has seen some planes which would not come back even after six or eight oscillations. Of course, this is not a satisfactory condition. Also, there is such a thing as getting the airplane *too* stable. It might even be so stiff that it cannot even be forced into oscillating. This, too, is a highly undesirable condition, since the airplane will be so heavy on the controls that it will be tiresome to fly.

In the case of dynamic instability, these same oscillations along the flight path are increased in magnitude as the airplane continues. No dampening effect is set up to control the oscillations and they continually grow larger. Figure 5 illustrates the tendencies of dynamic instability. Obviously, this can be a very dangerous condition, since the airplane might be accidentally displaced from level flight—as by a strong gust—and then it would be next to impossible to make the airplane re-assume level flight.

Figure 6 illustrates the case of dynamic neutrality. In this case, the oscillations are neither dampened out nor do they increase in magnitude. They continue unchanged along the flight path and the appearance of dynamic neutrality is similar to that of static stability.

The stability of any airplane should not be too great. If it is, the pilot will require controls that are too large to be easily handled. Such a condition makes what is termed a "stiff" airplane, or one that requires too large forces to control it. For an airplane that is to maneuver rapidly, such as a modern military pursuit airplane, the degree of stability is reduced to a minimum in order to permit of very light and easy control. A condition of slight stability—static and dynamic, very closely approaching the neutral—permits good maneuverability which is especially desirable for combat and stunting airplanes.

On the other hand, commercial airplanes and planes which must be flown over long distances must be very stable so that they can be easily flown "hands off." Of course, such an airplane cannot be very maneuverable, since it is so stable.

An airplane does not possess the same degree of stability for all changes of attitude. In fact, it may be stable through a certain range of angles of attack and unstable through another range. Instability in any sense is useless and unsafe and any airplane which exhibits some of these tendencies should be immediately investigated by an engineer fully capable of diagnosing the condition.

As to the degree of stability which a private airplane should possess, this lies somewhat with the prospective buyers and pilots. In general, the airplane should possess a good average degree of stability. It should be fairly easily controlled and, at the same time, should definitely not show any tendency towards neutrality or instability. So-called "tricky" airplanes should be left for the enjoyment of military pilots and the private pilot should be led to believe and trust in his own particular airplane.

So, the next time you go out to buy—or fly—an airplane, satisfy yourself as to its stability characteristics by following the above simple tests and definitions presented herewith.

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## Robert Taylor

(*Continued from page 55*)

ever accomplished on the Tucson airport. Everybody said the plane reminded them of Sonja Henie doing her stuff on skates in Madison Square Garden."

Bob has no particular liking for watermelons, either. But they had an irresistible lure for him on a landing later, at Met. The melons lined the runway. Bob landed on the runway all right But after he got on the ground, he took the Fairchild in with him to pick a couple. No damage to either melons or plane.

"You've got to land one of those things straight," he says. He thinks a minute, and adds "You know, maybe that particular Fairchild like watermelons."

Since then, he's got his landings straightened out, and all is well. But, sad to say, his only other cross-country to date has been to Oxnard, about 50 miles away.

"I've been spending my time between scenes boning up on the Civil Air Regulations and on meteorology and navigation," he explains. "As soon as this picture is finished, if ever, I'm going to get in the rest of my time and get my license."

There's a reason for this desire to get a ticket. The reason is his wife, Barbara Stanwyck, who looks a little askance at the yellow and black airplane. Miss Stanwyck has done plenty of flying on airliners which, she says, "feel as if they're stuck up there." But she's never been up in a private plane. Bob asked her to take a hop with Max at the controls, but she replied:

"No thanks. I'll wait until you get your license and we'll go for a little hop alone."

Barbara, who has been making "Pioneer Woman" over at Paramount, dropped in on the set while I was talking to Bob. Bob was called in to a scene to practice shooting Brian Donlevy, and I had a chance to talk airplanes with her.

"I think it's swell that Bob's flying," she said. "There are several reasons. The first is that he's never had a real hobby and doesn't know what to do with himself between pictures. Social rounds get a little tiresome after a while. The second is that it relaxes him and gives him a chance to play.

"A great many wives spoil flying for their husbands. I've heard plenty of young fellows say 'I used to fly until I got married, but my wife didn't like it, so I quit.' Bob has always wanted to fly and, now that he has a chance to fulfill his wish, I'd be a heel to object."

Bob has a ranch of 28 acres out in the San Fernando Valley, which isn't big enough for an adequate flying field. Barbara has 128 level acres nearby.

"I'd like to have him put up a hangar and put in a runway on my place," she told me. "That's the practical way to do it."

She says she is looking forward to that first flight, and that she'll be absolutely confident, once Bob has passed his flight tests.

Bob, having disposed of Donlevy to the satisfaction of the director, joined us. I asked him how he had become interested in flying in the first place.

"I've always wanted to fly, ever since I was a kid," he told me. "When I was about nine years old, a barnstormer landed in a stubblefield not far from our home in Beatrice, Neb. I haunted the fellow, tried to chisel a ride, but didn't get to first base," Bob said. "I was around from a little after sunrise until he tied down at sunset."

The Taylors didn't have too much money in those days—not enough to permit a flying course at anywhere from $25 to $50 per hour.

"I swore," Bob said, "that some day I'd make enough money to learn—providing that I *could* learn."

Bob went to grammar school and high school in Nebraska towns, came to Southern California for his college work. He'd learned to play several musical instruments, had qualified as an amateur actor, but had not had much chance to get near any airplanes. He went through Pomona College without the advantage of a CAA course.

"If they'd had one then, I'd have taken it," he said.

He was graduated in 1933, placed under contract by M-G-M at a very modest salary. For a while, he didn't "catch on" with the public. Then, suddenly, he started on the road to stardom.

Late in 1933 he had a chance to find out how practical airplanes were—in a tragic way. He received word that his father was seriously ill. He climbed aboard a transport plane.

"I arrived to be with dad before he died," he says, "and that meant everything. If I'd taken a train, I'd have been too late."

Incidentally, at Salt Lake, he bumped into Roscoe Ates, who has been flying for some time—he's the stuttering comic—and Roscoe sold him for the first time on the fun of being able to handle a ship himself.

Later, Bob saved his money and, every time the studio gave him time off, he'd get in an airplane and fly somewhere. He flew to Vancouver for a boat trip from there to Alaska; spanned the United States 15 times in transport planes and then flew nearly all over Europe in a plane chartered for him by M-G-M. This was after he made "A Yank at Oxford."

Bob today is in his late 20's. He has a great many years of flying ahead of him, already is talking about getting a larger and faster airplane.

"But, first," he says, "I'll have to get a couple of hundred hours and learn to roll straight. I wouldn't care much about having the boys start calling me 'Groundloop'."

Comes the spring and good weather and an end to "Billy the Kid," Bob says he'll spend all the time he can at Metropolitan, getting in time for the coveted ticket. Usually mobbed by fans, he gets a kick out of the easy-come, easy-go attitude at airports, where a motion picture player is just another pilot.

"Either a good one," Bob says, "or a bad one."

END

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## Adventurers' Airline

(*Continued from page 26*)

ment, insists on operating under CAA regulations. The CAA didn't want him, but Florida inspectors pointed out that he put in at Miami and Palm Beach quite often and that he is in reality their ward. Actually, no British air inspection or air regulatory body exists in this hot, wet corner of the world.

There's none of the barnstormer in Collar, either. No chances. The Grumman and the Douglas both have two-way radios. There are 22 British radio stations on the out islands and Collar talks to all of them all the time, or uses his key if they haven't voice.

Ask Collar how he keeps hitting islands on the nose, using only that compass, in the face of constantly shifting winds, drift that needs second-sight to read and figure, and he says:

"It's not too hard. You never get farther than 40 miles from any cay and the longest jump is about 80 miles."

To readers who get lost five miles off the airport, with the ground covered with identification marks, this seems to be sixth sense. Collar and Brink seem to have it. Both fly no more than 50 feet off the water, which doesn't give much opportunity to see far horizons, foul weather and fair.

Collar says:

"As long as you know where you're going there's no use putting a strain on your motors to get altitude you don't need. Might as well stay down, use that air cushion, get the greatest lift, get there faster and save gasoline."

Collar says that for sustained effort, a recent Paramount studios charter has been his hardest, most monotonous. He estimates 22 round trips between Nassau and Grank Turk and Salt Cay during the three weeks the elaborate expedition worked with Madeleine Carroll and Stirling Hayden on the salt-producing desert island. The Grumman and Douglas hauled more than 100 passengers, film iced to keep its emulsion from melting, camera and sound equipment and supplies. Edward H. Griffith, the producer-director, started out with personnel riding on boats, shifted to the airplanes exclusively after Collar's "rescue" of Tover and the other man. Collar and Brink whipped the ships for as long as 10 hours a day, making two round trips over the 450 mile course in the two planes.

Collar got the Luscombe "65" seaplane a year ago. It has about 700 hours on it. On acquiring it, he formed the Nassau Flying Club, taught 24 to fly. Fifteen went overseas to fly for England. Nine remain here, among them a director of Nassau's electrical department, the superintendent of the hospital, a leading lawyer, a contractor and his two sons and Nancy Oakes, daughter of Sir Harry Oakes. In this connection, Collar holds a re-rated instructor's license, commercial on 1S, 2S, 3S and 3M land, and 2S, 3S, and 3M sea, and an instrument rating.

Collar's background, both personal and flying, explains much of his success. He has more than 6,000 hours of flying, which started when, after trading his car for a Curtiss "F" boat, he taxied it around until he thought he could fly it, took off, dived it to gain speed, pulled up to lose it and finally went in with it. He and his passenger—get that, with a passenger!—were not injured, but the "F" boat was a little tired from the experience.

Collar, son of a sanitary engineer, was born January 8, 1901, at Kansas City. He went to Forsythe High School, at Forsythe, Mo., then to Valparaiso University at Valparaiso, Ind. He was just out of college when he stacked the "F." He decided that there were a couple of things he didn't know about flying, joined the Naval Reserve to find them out. Three years later, he wound up with a commission at Pensacola. A year with the fleet and he joined the Treasury Department, hunted for stills in Texas and Louisiana. Then he scoured the Florida coast for bootleggers and smugglers.

He did a stint with Harry Rogers, helping him with Suburban Airlines, toiled for Curtiss, joined the Roosevelt Field organization, went to Palm Beach with the organization to open the Florida branch. He ended up by taking over the branch with Art Williams, now operating a charter service at Georgetown, British Guinea. That lasted until 1932, when they bought the twin-Dieseled Towle and lost their shirts. He took a fling at operating a "Voice from the Sky" and operations costs licked him there.

So he came to Nassau with the lone Keystone *Commuter*.

Collar, who gets up in the middle of the night to speed supplies and physicians to hurricane-hit cays rushes physicians to patients on the out islands, picks erring yachtsmen off their navigation mistakes, flies injured and ill persons into Nassau and otherwise helps out around this section, tells some swell stories if he's in the mood. The one about five passengers and the corpse is one of his best.

A bootlegger had been drowned and his pals wanted him flown back to the mainland. Collar sat down with a load of five round-trip passengers. He asked them if they'd mind flying with a corpse. Collectively, they said they wouldn't. Individually, they ducked. Collar started his motors five times and each time he failed to get all of his five passengers into the plane. Meanwhile he was buying passengers drinks to build up morale.

"When one of the passengers pulled back the sheet which covered the corpse and asked him if he'd like a drink, I knew I had won," Collar said. "We swung the corpse aboard, carried on the five passengers and were off to a successful trip."

Collar, married 18 years, lives in a rented home in Nassau, likes his life, feels sorry for less adventurous people who don't get thrills once in a while.

Last, he's very apologetic.

"I wish," he says, ruefully, "I could give you something to write about. I'm afraid it's pretty dull stuff."

END

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## Aluminum

(*Continued from page 17*)

gram in Arkansas which will constitute a cost of more than $100,000,000. In addition to an aluminum production plant, there will be a gigantic plant for turning bauxite into aluminum and greatly facilitated methods for mining the bauxite in Saline county.

The new program in Arkansas includes mining of 800,000,000 tons of bauxite a year by the Aluminum Company of America; production of 400,000,000 pounds of alumina a year at a plant to be located near the bauxite deposits (mentioned below): production of 100,000,000 pounds of aluminum annually, leaving enough aluminum to be shipped to other plants in the country so that another 100,000,000 pounds of aluminum may be produced. The CIO reports that the U. S. Bureau of Mines estimated that the production in the Arkansas bauxite mines can be increased 300 per cent in 60 days and 500 per cent in four months.

Still another plant of the Aluminum Company of America is being constructed in Arkansas which will have a capacity of 400,000,000 pounds. Three new smelting plants—one at Massena, N. Y., with an annual capacity of 150,000,000 pounds; another in Portland, Ore., with a capacity of 90,000,000 pounds; and a third in Arkansas, capacity, 100,000,000 pounds—also are under construction.

The production of approximately 340,000,000 pounds per year from the plants covered by the new program, added to the Aluminum company's own plants of approximately 760,000,000 pounds per year, will give the company an output of nearly 1,100,000,000 pounds per year.

Hall's invention brought him a fortune running into millions. Three years after his discovery, he established the Pittsburgh Reduction Company, predecessor of the Aluminum Company of America. About the same time, a similar process was evolved by Paul Heroult in France. The Frenchman discovered his process by accident, but Hall's invention came after many years of doggedly pursuing the subject.

Strangely enough, an inventor named Robert Bunsen, a German chemist, in 1854 accidently passed a current through a molten mixture of aluminum chloride and common salt, splitting the former into chlorine which escaped and left aluminum which he collected as metallic beads. His was essentially the same method in use today.

When aluminum was first produced by the new process it sold for $8 per pound and the annual production capacity of the Aluminum company was 9,000 pounds. Today, effective Sept. 31, 1941, the price of aluminum has been reduced to 15 cents per pound. Until that date it sold for 17 cents per pound. Production is now 120,000 times that of 50 years ago.

Mining of bauxite is done by two methods. At the town of Bauxite, Ark., it is done by either stripping off the overburden of dirt and using the steam shovel, or by underground mining. Specimen drill holes locate the ore. In cases where the ore is not too deep in the ground the overlying earth is taken off, the bauxite dug from the earth with surface shovels. The final operation in this process consists of the use of a steel broom to make the surface of the bauxite as clean as possible. It takes skilled laborers to recognize this dirt which gathers in rock pockets and can cause faulty metal. To produce pure aluminum it must all be cleaned from the bauxite.

Underground mining is accomplished by entering the side of a hill. Electric engines, driven by storage batteries, pull the ore out in small cars operating on narrow-gauge tracks. These cars, tagged at the mills with an analysis of their contents, dump their ore on conveyor belts carrying the bauxite to crushers. Then, the ore goes into gigantic rotating cylindrical kilns, each 120 feet long, eight feet in diameter. The kilns turn slowly and are heated with natural gas. When the ore is poured, it resembles dry powder.

To make one ton of aluminum four tons of bauxite must be processed with six tons of fluorspar. There are no fluorspar sources and power in Arkansas; this is done usually in East St .Louis, Ill.

From the kilns, the ore is loaded onto the conveyors again and hauled to storage elevators and then in freight cars for shipment to the various fabricating plants throughout the nation.

At these plants, aluminum is poured into molds producing ingots which can be rolled, hot or cold, into thick plates for bridges or trains, into flexible sheets for airplane covering, or into aluminum foil so thin that it is only one-tenth the thickness of a newspaper page.

Inside the large aluminum producing plants machine tools have taken on a drastic change since the war. Intricate machinery designed to turn out in great quantities aluminum bottlecaps, seals, pots and pans and hundreds of other articles are now doing other tasks. Giant presses that once turned out coffee percolators are now producing airplane fittings. Other machines that made large aluminum kitchen ware for hotels and restaurants are turning out powder cans for the Navy, mobile kitchens for Army units.

The importance of all this is being brough directly home to the American individual. Recently Boy Scouts and Girl Scouts and other civic organizations conducted a coast-to-coast drive to raise 20,000,000 pounds of aluminum by collecting pots and pans, golf clubs, etc., which could be turned into plane parts.

The result produced millions of pounds of aluminum from every city, town and village in the U. S., but the whole amount was but a fraction of the 1,200,000,000 pounds expected to be required for 1942's military needs. But the plan served its purpose—to make Americans aware of the scarcity of the metal; the need for it to keep up warplane production.

The scrap collected aluminum will not be used directly in the manufacture of airplanes. Classified and remelted it will go into automotive pistons and other vitally important commercial uses, thereby releasing pure aluminum for bombers.

**Next month's issue will carry the story of the metal that may change the entire future of aviation: beryllium.**

END

## Airsick?

ONLY one airline passenger in 400 experienced airsickness during 1938-39-40 on United Air Lines' entire system, a recent company survey reveals. One person in 800 complained of oxygen want, one in 1,300 suffered from ear trouble, one in 1,400 complained of nervousness and one in 800 reported some miscellaneous discomfort. The survey also showed marked decrease in airsickness from 3.3 persons per 1,000 in 1938 to 1.2 persons per 1,000 during 1940.

Flight through comfortable altitudes, more comfortable cabin interiors and provision of oxygen facilities were given as the decline's cause.

## Millions

AMERICA'S aircraft industry spreads over 18 states from coast to coast, while its material-producing allies—whose products range from fish oil to silver, from aluminum to binder twine—reach into every state in the nation, according to a recent Aeronautical Chamber of Commerce survey. The aircraft industry itself spends about $70,000,000 monthly for materials and supplies; nearly $10,000,000 weekly goes to its more than a quarter of a million workers.


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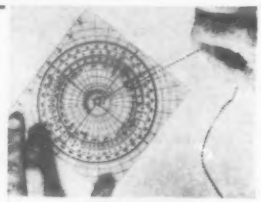

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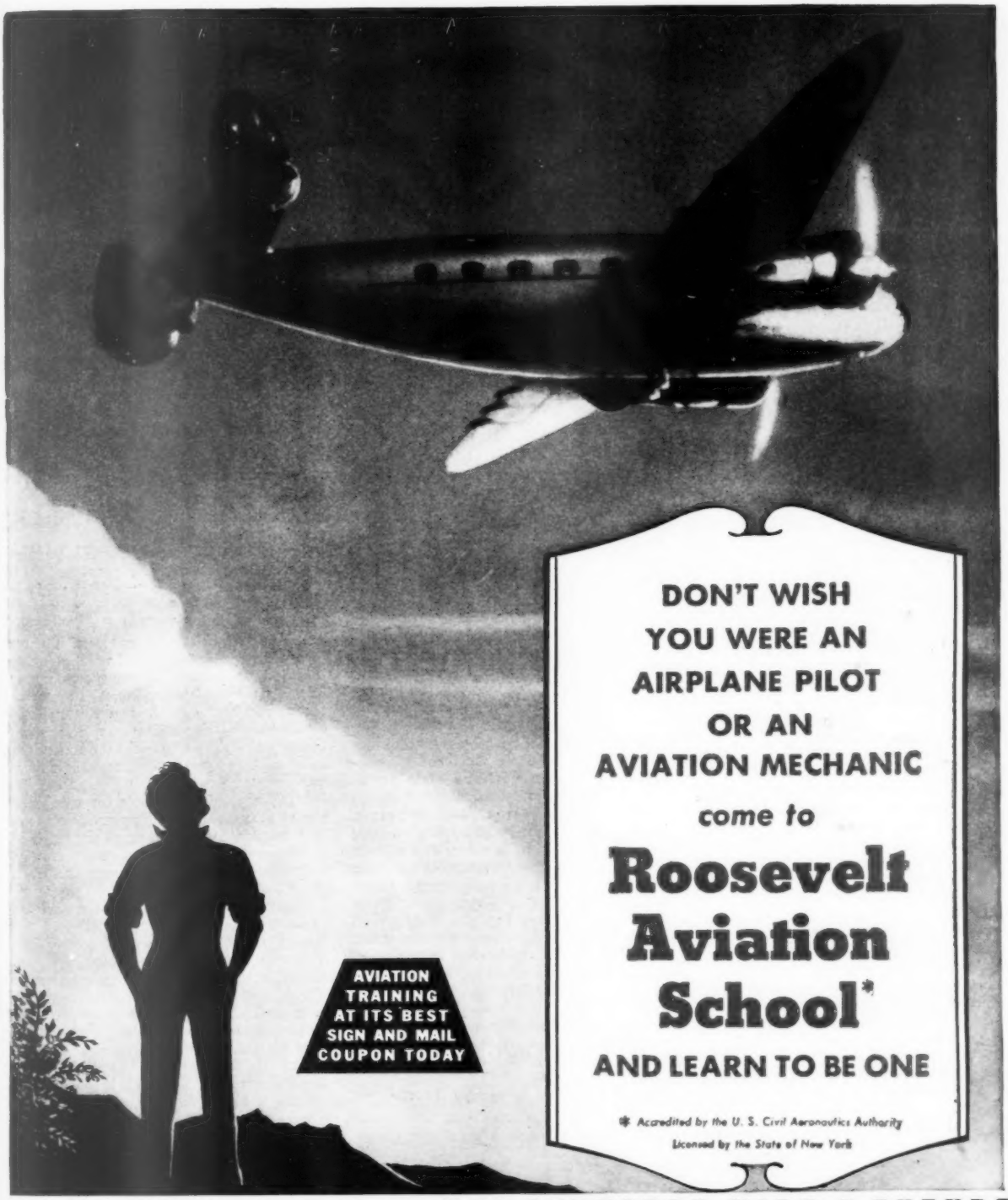


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P. A. NOV. 1941

## Army Maneuvers

(*Continued from page 27*)

at Tallulah, Arcadia and Shreveport, La., and Marshall, Tex. Down near the Gulf Coast the Blue Third Army concentrated under Gen. Walter N. Kreuger with his Third Task Air Force under Maj. Gen. Herbert A. Dargue, on airdromes at New Orleans and Lake Charles, La., and Beaumont and Houston, Tex., and observation units at Baton Rouge and Lafayette, La., and at Port Arthur and Beaumont, Tex.

The director of the big war—Lieut. Gen. Leslie J. McNair, was poised at Camp Polk, La., with starter's pistol—really a teletype machine. A hurricane swept along the Gulf Coast—a real and not a make-believe maneuver storm. Each of the two Army commanders wondered what his mission would be; and on those missions depended the employment and fate of the air forces involved. In the first phase starting September 14, the Second Army was smaller, but it had the crack unit armored force with it. The third was larger but more ponderous. The comparative strength of the forces? Well, by squadrons it was:

Medium bombardment: Reds, three; Blues, none.

Light bombardment: Reds, three plus two Marine Corps and one Navy dive bomber squadron. Blues, three plus two Navy dive bomber squadrons.

Pursuit: Reds, five squadrons, plus one Marine squadron. Blues, six squadrons plus two Navy fighter squadrons.

Reconnaissance: Reds, none. Blues, two squadrons.

Observation: Reds, six, plus one Marine squadron. Blues, 11 squadrons.

In other words, Reds and Blues were almost even in air force strength, but Blue was twice as strong in reconnaissance and observation aviation when the shooting started.

Counter air force operations, especially at the start, were decimating some of the squadrons. The war is still on as this goes to press and relative strengths are changing, but a total of from 700 to 1,000 airplanes will be employed by both sides—although fewer than this number will be in commission at any one time.

No heavy bombardment appears in this picture and little medium bombardment, as this is a question of air support for field armies with no real strategic charges such as industrial establishments or shipping. Nevertheless it gives one a spotty feeling to fly over the maneuver area with hundreds of thousands of soldiers on the ground and to be able to spot only a few thousand. They're over-conscious, their camps are concealed in the wooded sections. Their vehicles are well camouflaged, their command posts wonderfully so. That of one of the Army commanders appears to be a hamburger stand when viewed from the air, the other a lumber yard.

The parachute troops from Fort Benning, Ga., are based at Meridian, Miss., outside the maneuver area. They're making a raid first on the Reds and later on the Blues, to demonstrate their capabilities. Keen-eyed Col. Bill Lee, head of the jumping raiders, is putting on a good show, with his tough Fifth Red gang. The correspondents are waiting for the final maneuver critique to get the low-down on what was and should have been done by enemy air and ground men to fight them off. The wise ground commanders are studying the defense action at Crete.

Civilian *Cubs*, too, have made their appearance [see page 18.—Ed.]. They are being used as courier planes for certain air and ground headquarters. Regardless what air-military engineering bigwigs say, the outfits using them like the *Cubs*.

Types of military planes employed in the "war" are Curtiss P-40's, Lockheed P-38's, Bell P-39's, Republic P-43's and Navy and Marine fighters; North American B-25's, Douglas A-20A's and A-24's and assorted Navy and Marine dive bombers; a host of observation planes from the O-47A's to the Jeepy Stinson O-49's and even Jeepier *Cubs*.

With all the talk in brass hat circles concerning a separate air force it's significant to note that Navy and Marine dive bombers, fighters and observation outfits are in the Army Task Air Forces. Keep your attention on this item, readers; it will crop up again in future discussions.

Not only the ground units, but the air squadrons each have an umpire. These air umpires—most of them young lieutenants—fly with their units. They assess losses to airplanes and airdromes from air attack on bombardment. Their word is law; they have the backing of maneuvers No. 1 man, General McNair. They make the air-war as realistic as possible, penalizing those air commands where tactics and technique are faulty. Good umpires assess losses and delays to ground units.

On the night of September 14, General McNair gave the word to go. The Red army moved to the west to attack the Blues. The next morning they crossed bridges over the Red river and the Blues marched north against them.

For five days and nights fighting raged in the first phase of maneuvers. No sooner did ground force commanders frantically yell: "Where are our airplanes?", than the planes appeared to check the enemy's advance or put him to rout by blasting bridges, masses of armored force vehicles or strongly defended artillery positions. Both air task forces, operating under broad control of their respective Army commanders, "did their job in a workmanlike manner," according to senior air force observers. Enemy airdromes were repeatedly bombed. Expecting such action, air commanders kept their planes in the air on missions as often as permissible. Bridges along the Red River on the Blue Army's right flank were bombed the first day, forcing the Reds to use pontoon bridges. Blue aircraft warning service, centered at Alexandria and operating under Brig. Gen. William Ord Ryan, helped Blue throw up his interceptor pursuit to try to head off determined Red bombers.

Few actual aircraft accidents occurred to date, even though the great majority of pilots were juniors: two fatal mid-air collisions and one crash landing.

On the maneuver's third day, the Blues sent 127 parachute troopers, with their equipment, into the air. Landing inside the Red lines from 13 transports under friendly pursuit protection, the jumpers commandeered Red transportation and captured and demolished an important pontoon bridge, while a small detachment in a captured truck wormed their way into the Red Army headquarters. On the fourth day the Red armored force, smashing its way southward under continuous Red pursuit protection was stopped cold by Blue medium, light and dive bombers, including two Navy squadrons and even some bomb-laden pursuiters.

Observation aviation, less spectacular, performed herocially but craftily, in the face of pursuit opposition. The 22nd Observation Squadron, operating from a makeshift airdrome, one day performed 30 missions with a "loss" of seven ships from pursuit attack and antiaircraft fire.

One highlight of the "war" was the exploit of Maj. "Tommy" Green, Commander of the 151st Marine Corps Observation Squadron at Tallulah, La. His long reconnaissance mission completed, he pounced on a Red O-47A, reported it "shot down," was attacked in turn by enemy Navy fighters but escaped into some clouds through the protection of friendly P-40's, only to be shot down later on his way home—according to umpire rulings—by other Navy fighters. His outfit treasures a copy of the chief air umpire's comment on the mission . . .

On the fifth day the first war phase ended. It had been a strenuous period, but a worthwhile one from the Air Force's point of view. It afforded valuable and realistic experience to all concerned: mechanic, cook, pilot, "brass hat" and all commanders from squadron to air force.

END

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- Robert E. Lee, Jr., of Coleman, Texas, and Edward Kralich, Gilbert, Minnesota, completed their aircraft Engine Mechanic Courses on June 20 and were immediately employed by Pan American Airways, La Guardia Field, New York.
- James Christy of Chicago, Commercial Flight Instructor '41, writes: "I am now working for Mountain Airways at Casper, Wyoming. Will do my best to justify the confidence you have in me by getting me this job."
- Lyle Moore, Aircraft Sheet Metal, writes that he is working for Beech Aircraft at Wichita, Kansas.
- Stanton Knutson of Hayward, Wisconsin, writes that he had two offers of employment, but decided to accept a position with Glenn L. Martin in Baltimore, Maryland. Herbert Johnson has also gone to work for this Company.
- More than a dozen Spartan-trained Instrument Technicians have obtained employment with Eclipse Aviation Corp., Bendix, New Jersey, since May, 1941.
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## Lightplane to War

(*Continued from page 32*)

Thirty minutes after the ship had landed, the general received a radio message from Biggs Field saying that the ship was on its way! Radio may travel 186,000 miles per second but a lightplane had beaten it that time.

It was General Swift, incidentally, who tacked the appropriate name "grasshopper" to the squadron of light ships. Since then the word has become practically official and the ships are appropriately marked with a fast-flying grasshopper smoking a cigarette, while the pilots wear a "grasshopper" insignia pin on their uniforms. At the critique after the first problem was finished in the El Paso maneuvers, General Swift spoke words of high praise for the little ships and described them as the best message-carrying equipment the Army ever has had. During the next problems, which each last two or three days, a "grasshopper" was assigned to each of the nine tactical units participating in the maneuvers.

In carrying messages several systems are used. Ordinarily, the pilot actually lands near headquarters, delivers the message and awaits a reply. However, in many cases dropping the message was sufficient and effective. Regular Air Corps message bags were ideal, with long yellow streamers attached to enable easy location of the message after it had landed. However, the little ships can fly so low and slow that accurate dropping is a simple matter. I had the thrill once of dropping a message on a moving scout car and seeing the commanding officer actually catch the bag as it dropped on the rear seat!

One could go on for many paragraphs describing the amazing uses to which the planes were put and the many different ways in which they tend to speed up the entire operation of warfare. At the present time enthusiasm is so far along that the Army is ready to purchase an undisclosed number of the little ships and assign them directly to tactical units as an integral part. There are already in the Army many drafted private pilots with considerable experience. Army officials have already received countless letters from officers and enlisted men who have hundreds of hours and are anxious to be assigned to the "grasshopper" squadron when it is formed as a part of the Army. From these reports it appears that Air Force pilots would not be needed to fly the ships and thus be available for flying regular tactical aircraft.

The lightplanes have been put through practically every kind of gruelling test imaginable. First in the hilly and wooded sections of eastern Tennessee, then in the sizzling high altitude desert country. They are currently being used in Louisiana, during the largest maneuvers ever held in the nation. Louisiana is noted for its heavily wooded areas, swampy land and generally poor flying terrain. However, the ships are landing almost anywhere, using roads mainly as landing fields. Because of their relatively short span they can land even on roads which cut through the 100-foot-high pine trees. All over Louisiana, filling station operators are getting used to having a ship drop in for gas. I landed at one lonely gas station expecting to be greeted as a hero only to find that two other ships had been in that morning and that they had sold more gasoline to airplanes in the past few days than to automobiles! This extreme flexibility and freedom of action is desirable, as many flights involve being away on long reconnaisance missions of several hours, making it necessary to gas up before returning to the command post. A "grasshopped" pilot never worries about getting gas. He flies until the tank is empty, then squats at the nearest filling station.

Simplicity of maintenance is another factor which looms large in the utility of these ships. As with anything else, accidents will happen and at El Paso one of the pilots knocked off a landing gear in the middle of the desert. He immediately wired up his transmitter, contacted another "grasshopper," reported his trouble and one hour and 20 minutes after the accident had happened, a new landing gear and other parts had been flown to the scene and the plane was in the air. Incidentally, similar accidents have happened here in Louisiana to some of the Air Force's special slow-flying liaison aircraft—and they are out of commission for more than a month.

So the "grasshopper" squadron has finally shown its stuff and shown it well. As proof of the pudding, when the big maneuvers got under way September 1, there were not a mere 14 lightplanes in the battle, there were to have been nearer to 50 of them.

To top it off, the Priorities Board—at War Department request—has revised its aluminum rationing for the lightplane industry so that next year 8,000 lightplanes will be built, which is more than double the allotment for this year.

The lightplane no longer is the problem child of aviation. It has proven itself under the most grueling conditions and has shown the world that its a tough little critter and not just a toy.

END

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## Sixteen Dollar Airport

(*Continued from page 76*)

bile-trailer accidents, several ships were wrecked in flight before they arrived for the contest, other pilots broke their promises to attend and, when the contest day arrived, a crowd of approximately 3,000 persons came to the airport to see a glider meet. The found but one ship—the local club's. But the public didn't go home disappointed. Elaborate programs were distributed, an aviation expert described the working of the glider over a public address system, refreshment concessions boomed and brought in money and the glider was in the air constantly. Airplane tows were made over the city and surrounding area, spot landings were made a few feet from the spectators, public inspection of the ship was invited and, despite the lack of other ships, Schenectady residents went home assured they had an up and coming young club in their city—one they could feel proud of.

Only the club itself suffered from the experience. The members learned much. They learned, first, that the power pilots with their friends, that the public was encouraging them and that a second ship can be soon purchased with money to be raised by public subscription. Too, plans are being made for another meet, this time to be held on Loucks Field so that, in case anything does go wrong, nothing will happen to the existing friendship between power and glider pilots.

END

## Plane Checker

AN electric bulletin board which instantaneously posts plane movement information for the Washington Control Area has been installed in the CAA's airway-traffic control room at Washington National Airport. Airways between Washington and Philadelphia, Pa.; Norfolk, Va.; Raleigh and Greensboro, N. C.; Bristol, Tenn.; Florence, S. C.; Elkins and Martinsburg, W. Va.; and Harrisburg, Pa., are included.

An adaptation of automatic stock quotation apparatus, the device flashes numbers conveying desired information as fast as pilots report. A teletype-writer simultaneously records the facts for future reference. Pilots radio reports to ground stations, which in turn teletype them to the airport.

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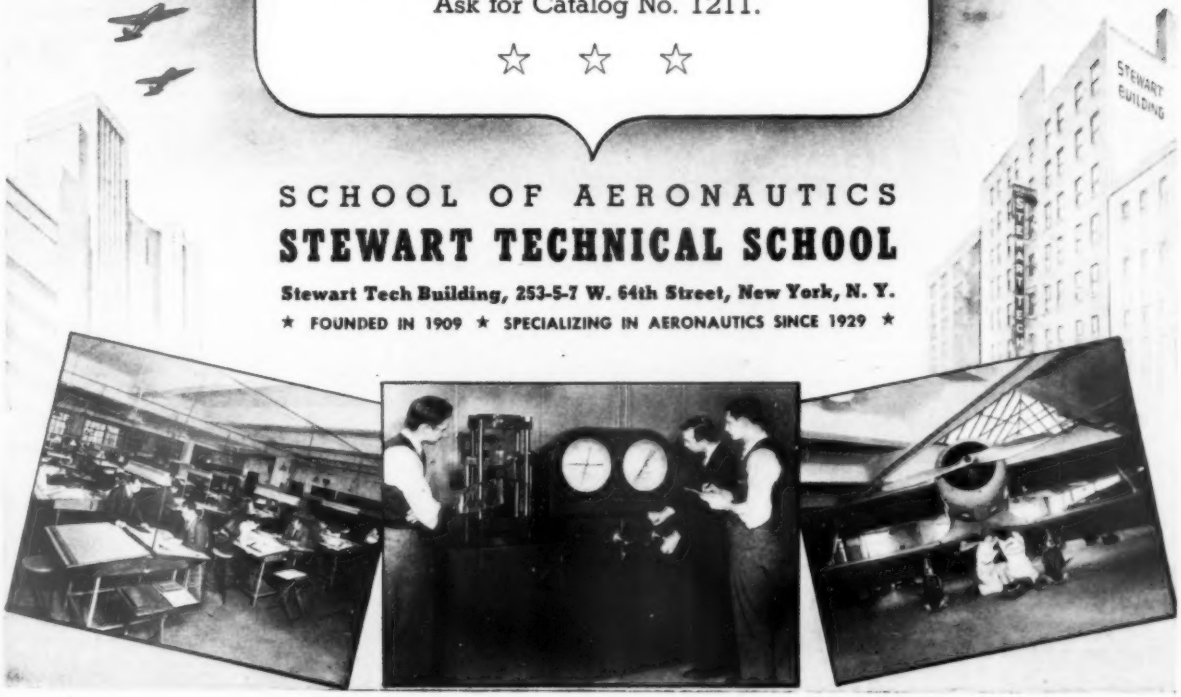


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## Fly North, Pilot

(*Continued from page 74*)

Anyone who is interested in building airplanes and in the future of aircraft after the war will realize, after a few weeks in Canada, that the United States has not yet touched a wide open field—the field of the slow traveling, high performance, heavy duty plane. The Fairchild "71" I flew was only three years old, yet it was built from a 12-year-old design. Obviously, design should have been improved during the past 12 years. The bush flyers simply can't get the airplanes they would like to have.

My ship, turning 1,820 r.p.m. and drawing 25 inches of mercury, cruising at about 90 m.p.h. This was plenty of speed. But carrying certain kinds of freight proves, at times, to be a bit of a chore. For, because of lack of good design, awkward loads can't be carried.

Jones told me about one little haul he made and cold chills ran up the spine of this so-called stunt pilot. It seems there was a range to be carried—a huge cooking range. It couldn't be put into the cabin, so "engineers" and the pilot laid two two-inch by 12-inch planks across the heavy freight pontoons, tied on the range and let her go. In spite of the tremendous weight and head resistance the pilot got where he wanted to go with the airplane, the stove and himself all in one piece on arrival. I know the drag of a Technicolor camera head stuck out in the slipstream and, had I drawn that job, I'd probably be right where the stove was delivered to me, cooking dinner on it.

If you happen to take a float job into Canada, you can count on meeting a great bunch of men. You'd expect that they'd be a little bit burned to have a group of Hollywood upstarts, who know just about as much about doing their kind of flying as a student pilot, descend on them and take over their controls. But, when we had our one bad landing, every "busher" in the bunch descended on the director and told him how often they'd made similar landings and how it couldn't be helped.

I've spoken of the shortage of radio. Well, it handed us a lot of hard work and a tremendous laugh. We were working on location some distance from Trout Lake, where we tied down nights, when we received a breathless message:

"There's a hurricane coming! Tie down your crates!"

We all hopped to Trout Lake, got out all the rope we could find, spent a couple of hours anchoring ourselves for any kind of a blow. We found out that a message that the hurricane was on its way had been intercepted by radio by one of our mechanics and a radio technician.

Hour after hour of sunshine passed, the sun sank. And then we got the lowdown.

The message was government. One station was reporting to another that an RCAF *Hurricane* was on route from some place to some place else and that it was at that moment in the vicinity of Trout Lake. The mechanic and the radio technician had heard just enough of the communication to hold up production for a day and cause a lot of trouble.

While there was a lot of flying, the actual work wasn't hard. There weren't any hairbreadth stunts cooked up to put super-super thrills into the picture and it looked to me, during the time I was in the air, as if the experts wouldn't have a great deal of flagrant errors to point to. The main story concerns not only the attempts of the bush flyers to get into the RCAF but the ability of Cagney, a pilot, to corner all the business by cutting prices. The "bushers" really go after him for trying to get away with that.

Getting away from the film story and summing it all up—if you have a pontoon job and didn't know what to do with it before reading this, now you know. If I were you, I'd start planning that vacation of fishing, swimming and flying right now. You'll have excellent flying and excellent "fields" on which to sit down; you'll find accommodations, although in some cases they're not what you'd expect to find at a fashionable summer resort; you'll find good weather except for the fogs, which aren't in every morning. And you'll find real flyers and real men who'll offer a helping hand at every happy landing. It's a paradise that lightplane flyers can't overlook.

END

## Flight Precedence

(*Continued from page 33*)

not in good standing, may have their name slats removed from the board, effectively "grounding" the pilot involved.

The system described takes all usual difficulties into account. The ship never is held down by an unkept appointment. The member having least time and money—and therefore doing the least flying—automatically has the ship available to him oftenest. The early bird need never wait for the sleeper-in, yet the sleeper-in, by the same token, has more chance of getting the ship when he arrives. A phone call or glance at the board will indicate how long it will be before the plane is available. It can be determined at any time just who is flying. There is no chance for confusion, no matter how many ships or pilots are involved.

The type and size of board used by the Flying Forty may be noted from the illustrations. Actual construction may vary to suit the individual club. A de luxe board could be made of bakelite or plastic in much smaller size, with members' names engraved in the slats and an electric "elapsed time since take-off" clock added.

The writer believes such a system as he describes will end precedence troubles of any flying club, regardless of size or amount of equipment.

END

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## Eggs Buy Plane

OTTO POBANZ and Joe Swain, both 18, of Repaupo, N. J., recently bought a Taylorcraft with their profits from selling chickens and eggs. The youths bought flying time toward their private licenses in the same manner.


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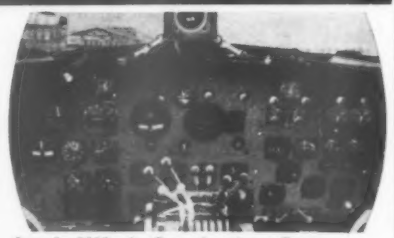

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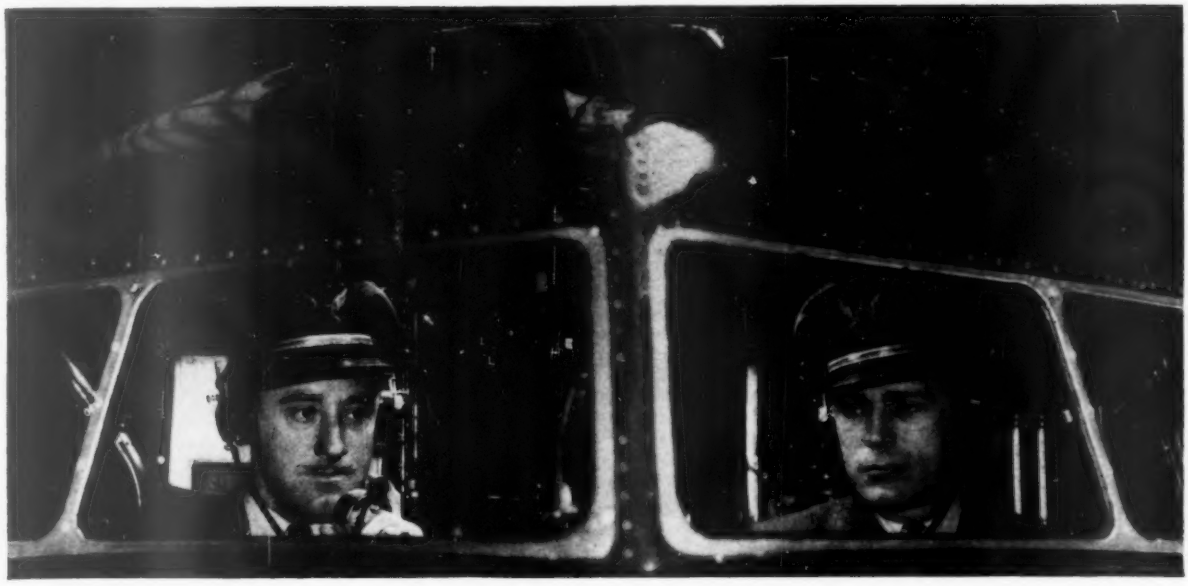

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## I Solo

(*Continued from page 52*)

35 pounds—the motor working perfectly. *Oh, oh!* the ignition is operating only off of magneto No. 2—the starting mag. I flip it just the second my eye catches the fact. The motor has two mags for ignition as a matter of safety. It will operate on either one perfectly. Little thoughts that pop through your head in the course of 15 or 20 seconds flight.

I start my turn back over the lake and settle back in the seat, scanning my course for that plane which took off ahead of me and I've been keeping track of in my take-off—among other things. Ah, there it is, ahead and above me.

I look around, at the lake, Queen Anne Hill brushing by on my right, at the hangar to see if they made the other kids go inside "to keep me from being too self-conscious" as they tell everyone and never do. And then it dawns on me, I'm not scared in the slightest. I've been too busy. The realization of the naturalness of it all is the most marvelous part of it all. It's the kind of exuberance that makes you feel as if you weigh 210 pounds and have shoulders five feet wide. I make one wing dip, and then the other, in response to my dictatorial will—now, who's master?

But I don't force the plane, for we get along very well together. We've got a lot of marvelous exploration to go through, my plane and I. It works for me and in return I direct it across new lakes, new bridges, docks, new islands, new to me—and I give it my promise I shall always protect it against any abuse. Quite a team, a pilot and his plane.

Only one trip around on solo flights and it is now time to do down, to bring Captain Van Amburg's craft again into contact with the everyday world. As I nose her down and close the throttle, making sure I'm giving her enough speed so she can do her part, I recall talk of landings being the most troublesome part of all, but that water way down below me doesn't look so bad, and landings have never bothered me particularly—not yet.

Your steed with which you had such a thorough understanding a few seconds back is getting balky. It wants to go back to the barn its way—the straightest way. Pegasus just doesn't have good judgment. She is changing fast from a swift water gull to some sort of mundane barnyard fowl—a fat old chicken, who beats the air pathetically in her flight.

Where a light touch brought instant response, now great amounts of aileron, rudder, and elevator bring only bewildered response, and perhaps a bit of the return of the old viciousness—tossing head at my efforts to maintain flight, a desire to cease the effort and take the easy way back to earth. But I kid her along—I touch her airleron, her rudder, her elevator to keep her at the proper angle.

All birds hover on their return to earth. Even so, when we are within a few feet of the water and the plane is ready to contact, I tease her by holding her off on those last few feet, making her, too, hover for her landing.

A soft rustle precedes the flying spray and the drumming of the drops on the tight fabric announce our lighting. Back to the water. How long ago was it we left? Enough thoughts have pinched my brain for an eternity—my pocket watch says about four minutes. The old handshake of the fellows as you climb out of the little plane—and it's over. Dean, my instructor, was the first to shake my hand. He said,

"That was a darn good solo. You can assure your mother that your landing and take-off were about perfect." Why he mentioned you, Mom, I haven't the slightest notion, but I'm conveying his words.

And so I soloed.

END

## Names for Planes

U. S. WARPLANES may get new names, likening them to birds, animals or reptiles, to acquaint the public with the various types of ships. The Air Corps has suggested such names for trainers as "fledglings"; transports, "elephants"; pursuit, "copperheads"; observation, "hawks"; bombers, "behemoths" or "rhinos." Engines already have been named *Cyclones, Whirlwinds, Wasps* and the like by their manufacturers. The idea is the outgrowth of Britain's naming American-built planes *Hudsons, Liberators, Catalinas,* etc.

"Here's your parachute, sir. We don't stop at Steamboat Springs . . ."

HERE'S the aviation employment story in a nutshell: Yesterday thousands of trained men were needed: today it's tens of thousands; tomorrow it will be hundreds of thousands. Yet, more important than quantity is personnel *quality*. Aviation's greatest need is for "lead men"—men who couple natural ability with adequate training to step into group and section leadership, department management and finally executive responsibilities. Such men are "marked" for success from the first day of their employment. As the training subsidiary of the Ryan Aeronautical Co., this school can give you the training you need for that kind of success in *flying, mechanics or engineering*. And Ryan "success training" costs no more than ordinary courses. You can graduate from a Ryan course into a job for as little as $100.

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## Women Can Fly

(*Continued from page 24*)

The above replies are favorable to women pilots, with the exception of the third question. Thus, it would seem that woman's trait of not being able to make up her mind stays with her after she has learned to fly.

What attributes do women flyers possess? First, they are more anxious to learn, more desirous of improving. After all her tears, she wants to strive for perfection and a failure to pass a flight test means harder, more diligent work. A woman is better adapted to "flying-by-feel," because the kinaesthetic muscle sense is more acute. The deep muscles being softer, a greater perception of speed, skid and slip is possible. And because of this, women become very smooth pilots. When it is combined with good performance in emergencies, it produces a perfect coordination resulting in good piloting.

In answering the question "can women fly?" we must know about abnormal flying—flying in weather, under conditions of stress, or military work. Examine a few of the questions sent out in the survey:

Would you trust a woman pilot in fair weather?—Yes: 85 per cent.

Would you trust a woman pilot in instrument weather?—No: 70 per cent.

Yould you fly an airline that employed women pilots?—No: 70 per cent.

Women are not physically fitted for strenuous flying, either in an airliner or a military combat plane. But there is a definite place for the girl who thinks she can fly, who takes lessons and who finds that she is as good in her own line as her brother. She can become an instructor—a better instructor, perhaps, than a man. Endowed by nature with patience in teaching, a woman makes a natural instructor and in a national emergency an instructor need not be a man; rudimentary flying can be taught as easily by a woman. Of the hundred-odd commercial women pilots, many could and should be allowed to serve their country.

Although 92 replies from instructors may not be the last word in what women flyers can or cannot do, their opinions were formed from close contact and appraisal of women as student pilots. They felt that the outdoor type of girl—the girl who has learned to catch a ball, not to scream at a mouse, to react bravely in an emergency—can learn to fly well. The fact that women take longer to solo and are more difficult to instruct may be attributable to certain strain, or some emotional traits that will always remain a natural handicap.

Looking at the picture from the viewpoint of what records they have made: There are many organizations in the United States for women who fly. The Ninety-Nines, an organization founded over 10 years ago by Amelia Earhart, has over 1,000 members. The Women Flyers of America has a goal of 5,000.

Are women pilots on a par with men? About 85 per cent reported in the negative. Women instructors agreed. The reason for this is based on the physical element, which is woman's greatest handicap when she competes with men.

Contrary to wishful thinking on the part of many women flyers, military flying is consequently not for them. The fact is that military flying is brutal, physically exacting, and difficult—especially combat work. The average woman could not possibly compete with the average man in this respect, mainly because her natural attributes are insufficient for the task. Women could do work in ferrying aircraft from factory to combat squadrons, aerial ambulance duty, flying mail transports, routine testing in aircraft factories and, of course, instruction in all phases from the purely theoretical ground school to the practical phases of flight instruction.

END

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## School for Defense

(*Continued from page 64*)

learn, quantity of work done, quality of work, industry, initiative, cooperativeness, adaptability, potential supervisory ability, dependability, disposition and reliability. Students are given one of five relative marks on each of these points, ranging from poor to outstanding, with qualifying remarks. By the end of three years' observation, advisers have a detailed understanding of a pupil's ability and place him in a job, usually, for which his rating indicates he is suitable. The three general classifications are: 1. those recommended for employment in aviation mechanics; 2. the average group, employable in allied trades; 3. those below average, not recommended for trade work involving hand skill.

School officials have worked up forms for teachers' use to report their findings when contacting personnel in the industry. On these forms a teacher who gets in touch with, say, Vought-Sikorsky Aircraft, will report with whom he spoke, number of jobs open, types of jobs and quality of work done by graduates already employed there. Mr. Noska himself spends much time every year visiting potential employers.

Mr. Noska resents the idea, which has gained some currency, that the S.A.T. is a boom product. Until 1930 his plant was a general continuation high school, but in that year Noska began to emphasize aviation mechanics. It has been growing in size steadily until it now has some 3,000 students and 113 teachers, and is exclusively concerned with aviation. The original building on 63rd street soon proved inadequate and in 1935 the city rented the Baron de Hirsch building on 64th street. This is still in use. Enrolment

# Dear Joe:

Your letter was almost as good as a visit with the gang. I'm not surprised that so many of the fellows back home are getting into aviation. It's one business where a man really has a chance.

But it's the guy with the training who's going places in aviation. There's no industry in the world that's so desperate for trained men, and believe me, they really give 'em the training here at Swallow.

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The location's a natural, too. I wish you could see the four big factories here in Wichita, all going like mad with millions and millions of defense contracts, and expanding every day. I drive around a lot evenings and look 'em over, trying to decide which one I want to work in. It won't be long now.

Hoping to see you here before long,

As ever,

Jim

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has reached a fairly level peak now, but until recently the start of every term brought new consternation to the staff because of the large increase. In 1936 it leaped 22 per cent.

The school has forged ahead because of several notable factors, including the enthusiasm of the student body, the competence of the teaching staff, cordial relations with industry and the substantial achievement in placement. However, classes are crowded and there is a shortage of aviation mechanics teachers. The Board of Education has made available too limited an appropriation for supplies and textbooks and the buildings lack auditorium, gymnasium and lunchroom.

Because of time limitations, school officials feel there is a great need for an advanced training school which would complete the best students' mechanical education. This idea has met with general approval and although no funds have yet been appropriated for the project, Mr. Noska expects a school building will go up soon at La Guardia Field.

Although the 3,000 students represent more than 40 different nationality backgrounds, they are extremely anti-Axis, perhaps because by learning a trade they are preparing themselves for the most important impulse toward good citizenship—a job.

Furthermore, Principal Noska has instituted a student-government system in a program of "Democracy in Education," through which the students themselves govern their activities and have a voice in their classes' conduct. What need for a pupil to study the democratic processes when he lives by them? Each class elects its officers, who automatically become members of the Association of Class Officers, just as the representative from your district acts as your voice in Congress. The A.C.O., in turn, elects officers and an executive committee. All together they govern student conduct. This is the most progressive force in the school, according to Mr. Noska.

But just now the accent is on turning out mechanics for defense, a job which keeps them really busy up at the Manhattan High School of Aviation Trades.

END

## AOPA

(*Continued from page* 54)

group got down to serious work on the airport program. As reviewed in the AOPA Section for April 1941, AOPA pilots, Dean Spencer, No. 3372, and George D. Wolff, No. 2163, got under way with their new airport. At another of their meetings, Fred R. Boynton of the Automobile Club of Washington, reviewed the history of the work accomplished by their club. The unit has also shown movies which includes "Wings of the Navy," "Wings Over Alaska," and amateur films of their many breakfast flights.

### The East Coast

Now we will skip clear across the United States to the AOPA Baltimore, Md., unit. It is a comparatively new unit and here are a few highlights of their third meeting held on September 3, 1941. The meeting was called to order at Logan Field Airport by the President of the unit, Dale King. The Secretary-Treasurer, Gwynn Lease made the treasurer's report. Ray Edgerton, organizer of the unit and now vice-president, read a letter from the national office to those present, explaining that the AOPA Air Guard was serving at this time in Washington as the basis for a nationwide plan. The new flight chairman reported that the unit was well represented with six ships that took part in the AOPA-Red Bank, N. J., flight. Although the AOPA *Baltimore Unit* is only three meetings old, they have already given their support to Howard Stevens who is starting a new field on Rolling Road serving the pilots of Baltimore County. They have contacted the Baltimore *News Post* to enlist their publicity to help put this new airport across. The flight committee consisting of Mr. Knott, Mr. Synodinos and Mr. Edgerton announced that about October 19 they would have a big breakfast flight to Baltimore. Pilots on the east coast wishing to know more about their flight plans are invited to write H. G. Lease, secretary-treasurer, AOPA Baltimore, Md., Unit, c/o Logan Field Airport, Baltimore, Md. There now are 20 members in the unit and the most recent include William T. Starkey, William Hohne, Laurence Willson, Jr., Harold O. Warnick and Morris Austin.

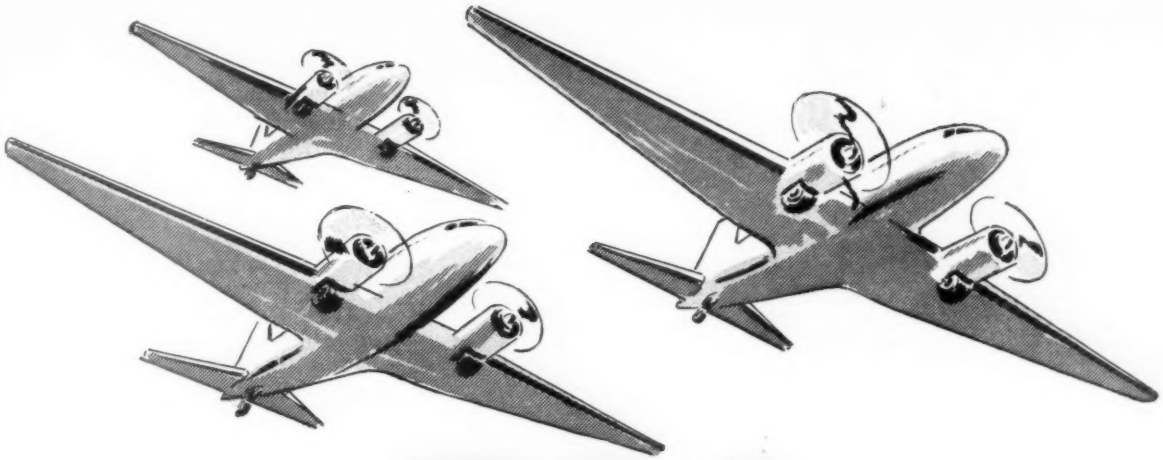
### Lone Star State

The AOPA *Houston Unit* was founded by Jack Miller, the photographer, and at present the unit is ably directed by Dr. Robert C. L. Robertson as well as William Rochford, another active member of the AOPA Houston unit. Both are members of the aviation committee of the Houston Chamber of Commerce. J. S. Roberts, secretary-treasurer of the unit, A. W. Larkin and other members of this AOPA unit also are active on the aviation committee. In this way they are able to put through many of their plans for improving conditions affecting the private pilots surrounding Houston. One of their greatest accomplishments was in preventing the city regulation which would prevent pilots from flying under 4,000 feet at any point over the city limits. This would have made the three airports on the very edge of the city virtually useless. This unit also has been leading the way for better state legislation and they have fought vigorously such legislation as might cause further curtailment of private flying.

### In the Mid-West

The AOPA *Freeport, Ill., Unit,* led by Lloyd Wallace, has been solely responsible for special enabling legislation in the state of Illinois, which permits cities to have the authority to operate and manage municipal airports on county property. Until they pushed this legislation through Springfield it was impossible for cities to take advantage of certain county properties for airport purposes.

The AOPA *Chicago Unit* has been instrumental in: (1) Sponsoring the big-



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gest air show that Chicago has ever had, (2) Arranging for a special landing beam between Ashburn and Harlem Airports with the assistance of J. B. Hartranft, AOPA's Executive Secretary, (3) Arranged many excellent breakfast flights, (4) Improved service for the private pilots around the Chicago area.

The AOPA Cedar Rapids, Ia., Unit is one of the largest in the United States, based on the number of AOPA members to the population of the city. The unit has sponsored several excellent breakfast flights and assisted the Des Moines Unit in fighting the proposed state legislation which would place additional taxes on the private pilots.

The AOPA Coffeyville, Kans., Unit has been leading the way in the state of Kansas for the non-scheduled pilots.

The AOPA Shreveport, La., Unit was founded by Clifton Stovall, AOPA Member No. 1350. This unit has been active in the Lousiana State Air Tour and has a large percentage of the number of pilots around Shreveport registered with AOPA—thanks to Stovall.

The AOPA Marlboro, Mass., Unit was founded by Waldo Jones who now is in the Royal Canadian Air Force. The unit has established their own club house and has kept close touch with the Chicago office, having rendered many good suggestions which were passed on to other units.

The AOPA Grand Rapids, Mich., Unit was founded by Carl Susemihl, AOPA Member No. 3666, and Charles C. Childs, AOPA Member No. 5339, both of Central Air Service at the Grand Rapids Municipal Airport. The membership chairman is Harold Silverman and memberships are coming in right along. By organizing all the pilots in Grand Rapids, it has become easier for the management of the airport, as well as the operations department of Pennsylvania Central Airlines, to have a better understanding of traffic regulations and safety. This is a typical example as to why private pilots should get together in their own *closed* meetings as an AOPA unit, which automatically excludes all others who have not soloed, to discuss their problems. Pilots who find it necessary to fly from airline terminals should take advantage of the offer made by AOPA to establish their own local AOPA unit. Once a formal unit has been established it is much easier to obtain cooperation from airlines by dealing directly with the national service office in Chicago.

In the state of Minnesota the AOPA Rochester, Minn., Unit has set the pattern for other Minnesota cities to follow. The present officers include Vane J. Baatz, president; Art Hoffman, treasurer; and Richard Lawler, secretary. Through the Rochester Unit, a close watch has been kept on pending action in the St. Paul capitol to enforce some tax legislation. Pilots who wish to prevent this type of legislation should register immediately with AOPA and if there is no official Unit in the vicinity of their airport they should start the ball rolling and organize one.

Other AOPA recognized units include those of Columbia, Mo.; Marshall, Mo.; Jefferson City, Mo.; Brady, Mont.; Essex County, N. J.; Aviation Club of Atlantic City, Millville, N. J. Flying Club; New York City; Albany, N. Y.; Staten Island, N. Y.; Flying Squadron Unit, Highpoint, N. C.; Cleveland, O.; Cincinnati, O.; Ashland, O.; Meadville, Pa.; Wilkes-Barre-Wyoming Valley, Pa.; Bristol Airport and many others.

END

## Plane Fish-Planting

(*Continued from page 29*)

of from 800 to 1,000 pounds, making possible the installation of three or four separate tanks, each having its own dump valve and aerating pump. Thus the aircraft could serve three or four lakes on one trip.

The plane should be capable of operating at altitudes up to 15,000 feet, and from 1,200-foot runways with a full payload. It should have a stalling speed not in excess of 60 m.p.h. and should be highly maneuverable at low speeds.

Since these initial experiments, the stocking of high altitude lakes by plane has spread until it is a vital factor in conservation from Canada to Mexico. Eventually it may reach the point in economy and speed to where it will be found practical for stocking all lakes, whether accessible by surface means or not.

END

## Junior Air Force

(*Continued from page 61*)

set up, some wearing uniforms, others merely neighborhood clubs. These organizations working on locally developed programs, were not felt to be doing a standardized job for the boys, nor in every case giving them adequate training. The cost of the uniforms frequently was too high for the average air-minded boy, as in the case of one large city group whose members even were required to carry small canes and wear white gloves to meetings. Now the standardized Air Cadet uniform is available to the boys through the locally sponsoring body, such as the local school board, service club, or municipality. Air-minded boys, if they meet the physical standards, will not be kept from pursuing their hopes for joining the Royal Canadian Air Force through inability to buy a uniform.

The Boy Scouts of Canada also have enlarged on their aviation merit badges with the creation of new badges and a new rank, flying lion, in two grades. It is the equivalent of an aerial Eagle Scout in the United States. In creating the flying lion ranks the Boy Scouts are endeavoring to meet their members' demands for more air training and model air plane building.

The new Air Cadets of Canada are divided into senior and junior groups, the senior group for boys 15 to 18 years old, the junior group for boys 12 to 14. The Air Cadets' program includes instruction in flying fundamentals, model airplane building and flying and learning to distinguish British and Axis plane types; actual flying, to learn the sensation of flying; how to help at airfields in emer-

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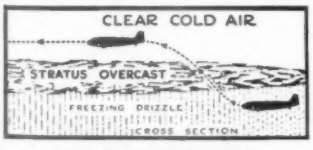


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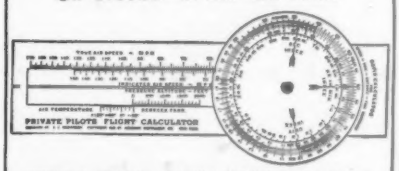


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gencies, airfield operation technique and maintenance and ground staff work. Besides this air training the boys receive ample military drill and are frequently inspected by R.C.A.F. officers in the same way as boys going to military boarding schools.

Air Cadet League headquarters are at Ottawa, where the formation of local units must be approved. The organization is sponsored by the Department of National Defense for Air, the government department which controls the R.C.A.F. The Air Cadets' aim is to train its members sufficiently so that when they reach their 19th birthdays they can step into the Royal Canadian Air Force, if fit. Their training will shortcut their appointments to operational posts, making them of immediate value to the air force.

The Air Cadets is purely a voluntary organization, in operation at a number of schools in the same way as other cadet bodies. It is not confined throughout Canada to boys, although girl Air Cadets are not yet officially recognized. Where organized on a local basis the girls have a somewhat similar program to that of the boys.

END

## Pilot Plant

(*Continued from page 60*)

training, the rate of elimination at the school itself has been relatively low. For example, out of the 95 students enrolled in the original five classes, only about 10 per cent have been dropped thus far.

After getting his 100 to 115 flying hours and 400 hours of ground instruction at Tracy, the student receives 15 hours of instruction in the multi-motored transports at Boeing school. Then, upon passing the strict Government and company tests, he receives his wings as a first officer.

During his time at Tracy, the student is paid $60 a month, enough to cover his board and room and to permit a little spending money. United Air Lines pays about two-thirds the cost of instruction and the student makes up the balance in monthly payments after he goes into service. At the start of his career as a first officer, the graduate receives $200 a month. Increases of $20 a month every six months is the order until the basic rate of pay is $375 for a first officer after six years of service.

Usually, a first officer becomes a reserve captain in about three years and a full-fledged captain two years after that. Thus, the student graduating from Tracy can expect to spend about five years before he has a regular captain's rating. Considering the fact that the average graduate is only 22, he still will be under 30 when he takes over the command of an airliner. Also considering the fact that United Air Lines' retirement income plan fixes the voluntary retirement age of a pilot at 60, he will have a relatively long professional career.

The men coming out of our training school have given every indication that they are happy in their work and enthusiastic about the future. They appear confident that their careers as flight officers will be successful ones—and a good deal of that confidence probably stems from their own knowledge that they have learned well.

We undertook the training school program at considerable expense and, as pointed out before, without any precedents to rely on. We were confident that the project would be successful but we could not know the extent of that success until almost a year later.

It is gratifying to be able to report that the success of our pilot-training program has been established beyond all question and that the Tracy graduates now flying our routes are living up to the highest standards. We welcome them into the ranks of the nation's airline pilots and share their confidence about the future.

END

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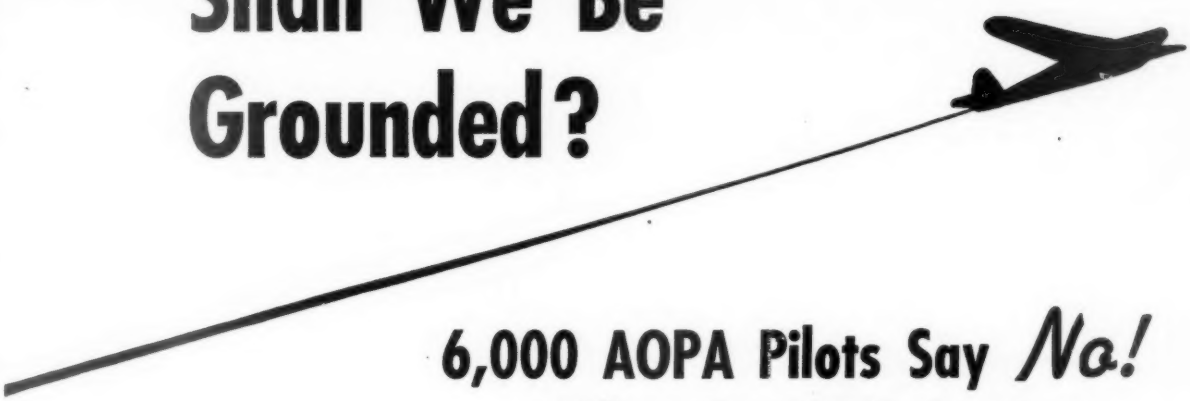

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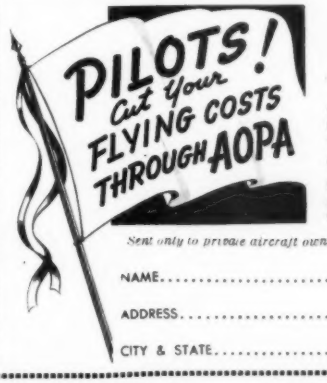


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**OCTOBER ISSUE**

**RADIO NEWS**

**AT ALL NEWSSTANDS**


## New Private Flying Record

PRIVATE flying hung up another all-time record in 1940, when nearly a million miles were flown per fatal accident. These figures continue the year-by-year improvement in safety records which extend back five years. 1940 figures are a great improvement over 1939, which was, in turn, better than 1938, and so on. Last year the figures show that 229,000,000 miles were flown by private pilots with and without passengers, in 16,500 airplanes. The total of 231 fatal accidents works out exactly 991,842 miles of flying for each one—a magnificent achievement. Next year that figure will be higher. Gen. Donald H. Connolly, CAA Administrator, said that the CPT Programs, with their safety precautions, have had a marked influence on this new safety record. The proof that private flying is becoming safer every year lies in the insurance figures. In 1939 the premiums for standard coverage on a $3,000 airplane were $20. Last year the same coverage cost $9. It is still going down.

## Panagra Moves In

PARALLELING or displacing airways formerly operated by Germany's *Luft-hansa*, Panagra (Pan American-Grace Airways) South American extensions in recent months have totalled 2,850 miles, an increase of more than 55 per cent over previous total mileage. With 7,800 miles of airways in regularly scheduled operations, Panagra, in route mileage, now ranks ahead of all U. S. domestic airlines and is second only to the international system of Pan American Airways, with which it is associated. Only two German routes continue to operate in Panagra territory and both are paralleled by the American company.

## Pilot Production

AIR Corps pilot production under current national defense expansion has been stepped up so staggeringly that as many flyers are trained now in one year at Randolph Field, Tex., alone, as were instructed in the entire Air Corps in almost two decades before 1939. During the 17-year period from 1921, when the flying cadet system went into effect, to the summer of 1939, when the first expansion program became operative, total students completing both primary and basic training was 4,236, as compared with 4,500 expected to be trained and sent to advanced schools from Randolph this year.

## Army Traffic

AN aerial traffic control system charts the skies above Randolph Field, Tex., into areas and channels set aside for various types of light training. Special rules are enforced for night flying. Accident dangers for the 300 basic training planes stationed at the field thus are minimized.

## Letters

*(Continued from page 6)*

as a private, then apply for aviation instruction and, subsequently, his transfer.—Ed.

### Safe Flying

Sirs:

Read J. L. H. Peck's article, "Is Your Flying Safe?" in your July issue and thought it was very good, but must totally disagree with the author on a few points. Mr. Peck gives the impression that an airplane's maneuvering qualities actually differ and are less responsive in a tailwind than in a headwind. If a ship is flying 80 m.p.h. airspeed with a tailwind, it will respond to the controls just as effectively as if it were flying at the same airspeed with a headwind. In both cases the airplane is traveling at the same speed in relation to the relative air and the same pressures would be created on the control surfaces.

A low downwind turn is dangerous only so far as stalling is concerned, due to an illusion of greater airspeed being created. The pilot is apt to pull the ship into a steeper climb than his airspeed warrants.

In landing, if the ship stalls and settles to the ground at 35 m.p.h. airspeed while making a headwind landing, it likewise will stall and settle at 35 m.p.h. while making a tailwind landing. The only difference is encountered as or after the wheels contact the ground. Again the illusion is playing tricks on the pilot's mind. He is unconsciously associating the airplane's maneuverable qualities with his ground speed.

Mr. Peck also refers to stunting with a passenger as a CAR violation. It is permissable to stunt with a passenger so long as the passenger is not paying for the trip and is adequately equipped with a parachute. This is assuming, of course, that the pilot holds at least a private license. [Yet this regulation is one of those violated with astonishing frequency.—Ed.]

LEROY MILLER.
Visalia, Cal.

### Mr. Grey Again

Sirs:

. . . I was surprised to read the footnote to a letter written by Dennis M Powell in the June issue of FLYING AND POPULAR AVIATION, stating that C. G. Grey is noted for his inaccuracies. . . . It seems hardly possible that anyone knowing Mr Grey's record with The Aeroplane and as co-editor of Jane's All the World's Aircraft (universally accepted as the most authentic aviation guide) could make such a statement . . . In spite of the mess we are in here, we still retain among us a sufficient number of common-sense people who like to appreciate the true position of things and Mr. Grey still has as much respect as he ever did. You might be wrong in accepting Mr. Powell as representative of the average Englishman.

The term "Yank-baiting" you delight

in using is unjust . . . I believe Mr. Grey's repeated boosting of Lycoming, Bill Stout's advocations, Glenn Martin's aircraft, Consolidated's flying boats clearly shows this. Generally, when Mr. Grey condemns a plane or a motor [he ultimately is proved correct] . . .

JOHN MILLER,
19 Dartmouth Park Rd.
London, England.

● Our statement still stands.—Ed.

### Airabonita

Sirs:

In the August issue of your magazine you mention Bell Aircraft Corporation's *Airabonita* . . . Maybe there is such a plane, but I'm entirely unfamiliar with it and would like to know what it's like.

JAMES A. GRESHAM.
Indianapolis, Ind.

● An experimental version of Bell's famed *Airacobra*, with conventional instead of tricycle landing gear, was submitted to the Navy for tests a few months ago. Known as the *Airabonita* (FL-1), the design had not been ordered in quantity at this writing.—Ed.

### Army Issue (Cont.)

Sirs:

The Army Air Forces issue is a very fine volume . . . It is a credit to your company and to the Army Air Forces.

LIEUT. GEN. HENRY H. ARNOLD,
Chief, U. S. Army Air Forces.
Washington, D. C.

Sirs:

The . . . issue is undoubtedly about the best-looking and most imposing magazine I have seen lately, and everyone who has seen it in my office has commented on the photography, the very complete information and the beauty of the magazine . . .

CLIFFORD DAVIS,
Representative from Tennessee.
Washington, D. C.

Sirs:

I have found the . . . issue . . . most interesting and shall keep it handy as a reference. It is a fine presentation of the Army Air Forces' organization and development.

JOHN VICTORY,
Secretary,
National Advisory Committee for Aeronautics.
Washington, D. C.

Sirs:

[It] is a splendid piece of work, both inside and out. It will make a valuable addition to any library.

P. G. JOHNSON,
President,
Boeing Aircraft Co.
Seattle, Wash.

Sirs:

The . . . issue is one of the most interesting magazines I have ever read . . . I am sure it will prove of great reference value in quickly finding out anything to do with the organization of the Army Air Forces.

JAMES B. TAYLOR, JR.,
Lieutenant Commander, U.S.N.R.
Washington, D. C.

Sirs:

It is one of the most complete and best organized issues that I have ever seen.

LIEUT. THOMAS C. KEACH,
Squadron Commander,
25th Bombardment Group.
Borinquen Field, P. R.

Sirs:

I believe [it] is the finest edition I have ever seen.

JOHN B. WALKER,
Assistant to President,
United Air Lines.
New York, N. Y.

Sirs:

The . . . issue is a thing of beauty and real value.

CARL FRIEDLANDER,
President,
Aeronca Aircraft Corp.
Middletown, O.

Sirs:

. . . The volume is full of interest and contains much data which would be of great value for reference purposes.

ROBERT C. RICHARDSON, JR.,
Major General, U. S. Army.
Headquarters Seventh Army Corps,
Birmingham, Ala.

Sirs:

While I have had an opportunity to read the Air Forces Issue only hastily, I am looking forward to reading it carefully in the near future. . . . However, I have seen enough of it to convince me that it will render a very great public


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SUMNER SEWALL,
Governor,
State of Maine.

Augusta, Me.

---

Sirs:

I congratulate you . . . It is an interesting and a timely job.

HENRY F. GUGGENHEIM.

New York, N. Y.

---

Sirs:

. . . My heartiest congratulations . . . You have every reason to be proud of your achievement . . . I am sure that everyone interested in aviation has found this issue both enormously interesting and informative.

WILLIAM H. KLENKE, JR.,
Assistant Sales Manager,
Vultee Aircraft, Inc.

Vultee Field, Cal.

---

Sirs:

The Army Air Forces issue of your magazine, I am sure, will be of wide interest.

GEN. GEORGE C. MARSHALL,
Chief of Staff,
U. S. Army.

Washington, D. C.

---

Sirs:

I found the . . . issue most interesting and informative. I believe that it will do much to inform the nation of the steps that are being taken to provide them with the greatest air force in the world.

LOUIS C. RABAUT,
Representative from Michigan.

Washington, D. C.

---

Sirs:

The . . . issue is the most interesting publication that I have seen on the structure of the Army Air Forces.

O. W. TIMM,
President,
Timm Aircraft Corp.

Van Nuys, Cal.

---

Sirs:

The . . . issue . . . is certainly a wonderful production . . . I am delighted to have it available. I congratulate you on the manner in which you have done this job.

ROBERT A. TAFT,
Senator from Ohio.

Washington, D. C.

---

Sirs:

. . . Rest assured that . . . issue . . . will go with belongings I treasure highly.

RUDY ARNOLD.

Brooklyn, N. Y.

---

Sirs:

CONGRATULATIONS ON AN OUTSTANDING PIECE OF WORK.

JACK BAILHE,
Vultee Aircraft, Inc.

Nashville, Tenn.

---

Sirs:

. . . The information it contains regarding our Air Forces is most enlightening. It will constitute a valuable addition to any aviation library.

EDWARD A. TAPPE,
Transcontinental & Western Air, Inc.

Kansas City, Mo.

---

Sirs:

I want to congratulate you on the very splendid job . . . It not only lived up to all advance notices, but certainly has set some kind of record at which future performances may be aimed.

MAX B. COOK,
Promotion Editor,
Scripps-Howard Newspapers.

New York, N. Y.

---

Sirs:

I personally consider the . . . issue of your magazine the best presentation ever made of the Army Air Force.

C. C. MOSELEY,
President,
Cal-Aero Academy.

Glendale, Cal.

---

Sirs:

It has been with great delight that I have gone through the pages of your splendid Army Air Forces' issue. I have learned many interesting facts which I shall include in my report. This data undoubtedly will be of the greatest value to my own Air Force.

JOSE PEREZ ALLENDE,
Lieutenant Colonel Air Corps,
Mexican Army.

Washington, D. C.

---

Sirs:

Such a publication as . . . the Army Air Forces' Issue will go a long way in presenting to the public what the U. S. Army Air Forces are and hope to do.

MAJ. GEN. DAVENPORT JOHNSON,
Headquarters,
Caribbean Air Force.

Albrook Field, C.Z.

---

Sirs:

Congratulations on the fine . . . issue. I consider it extremely well done and of great value as a reference book.

HAROLD HOLMES,
Interstate Aircraft
and Engineering Corp.

El Segundo, Cal.

---

Sirs:

. . . The Air Forces Issue . . . is indeed a very valuable contribution to my library and I know the information contained therein will be of the greatest use to me.

F. W. BOWHILL,
Air Chief Marshal,
Royal Air Force
Ferry Command

Montreal, Can.

---

Sirs:

I have read with great interest a number of the articles in the . . . issue. We are sure it will be a valuable addition to our library. The development of American aviation naturally is of vital interest to all Hollanders, particularly

so in view of the many United States machines now in use or enroute to the Dutch East Indies.

Your plane silhouette file already proved handy to our photographic department in identifying a number of American planes shown in photographs of aerial patrols over the East Indies sent to us from Batavia.

N. A. C. SLOTEMAKER de BRUINE,
Director,
Netherlands Information Bureau.
New York, N. Y.

---

Sirs:

There is nothing that the country needs more than to understand the opportunity ahead of it in the air . . . Your . . . issue is a demonstration of how fully alive you are to this situation and your willingness and desire to be as helpful as possible

HAROLD H. BURTON,
Senator from Ohio
Washington, D. C.

---

Sirs:

The many fine pictures and articles . . . certainly reflect many months of painstaking effort put into the issue.

FRANCIS CASE,
Representative from South Dakota
Washington, D. C.

---

Sirs:

The . . . issue is certainly a splendid effort on your part to help National Defense and to acquaint the American public with, and to give people at least some idea of, our present Air Force.

FRED BRADLEY,
Representative from Michigan
Washington, D. C.

---

## Low-Cost Flying

Sirs:

I was interested in "Lend-Lease Pilots" in FLYING AND POPULAR AVIATION'S June issue. Eighty-seven dollars is cheap, but I can't resist the temptation to do a little bragging about our flying club. We think we have the lowest cost club in the U. S. here. If you are one of the fortunate ones that get a student pilot certificate in the minimum of eight hours' flight instruction, the cost will be less than $50. This includes everything except the medical examination fee.

Costs are as follows: flight instruction, $5.25 per hour; yearly dues, $5; solo flying, $2.25 per hour, everything furnished. Our plane is a privately owned *Cub*, rented to the club on a yearly contract. It was new late last summer when the club was started. We have a hangar and rent the field. We use a log sheet to insure efficient use of our—and the instructor's —time.

CLIFFORD THOEN.
Rolla, N. D.

---

## Lightplane Bombers

Sirs:

. . . In order to stop fast moving tanks and mobile units now used in "blitzkrieg warfare," would it be possible to develop these new plastic planes in a very small ship with inexpensive motor? These could carry four or six small bombs. The idea would be literally to fill the air with swarms of them, operating from a base near the "blitz."

Have them protected overhead with large fighters, but use the cheap plastic planes to scoot in over trees and obstacles, dump their bombs on a tank or mobile unit, then dash back to the base for another load of bombs and repeat. Such planes wouldn't need instruments or a large cruising radius. They should be manufactured very cheaply by mass production methods. . . .

The pilots wouldn't need the extensive training required to fly combat ships and bombers; hence they could be trained just for this purpose in large numbers very cheaply. . . .

W. M. GIFFIN.
San Francisco, Cal.

## Bombs vs. Nazis

Sirs:

. . . In your May issue in "Hitler's New Warbirds" are these lines: "The RAF's only immediate alternatives against the heavily armored Nazis are high volume of fire against tail and wing surfaces or even, in a pinch, actual ramming." Why couldn't the fighter planes be equipped with light bombs and then horizontal bomb or dive bomb those big four-motored bombers . . .?

DON SURPRENANT.
Worthington, Minn.

● Pilots in both the World War and this war are reported to have tried such tactics, with little success.—Ed.

END


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## FLYING FLEETS

by S. Paul Johnston. 188 pp. Illustrated. Duell, Sloan & Pearce, Inc., N. Y. 1941.

Here stands the history of American naval aviation, from origin to the present. While a remarkable amount of factual data is crammed in, the superb photographs which illustrate every phase of our sky fleets' activities give the volume its real punch. Forgotten planes come to life again, along with our latest Navy warplanes. "Mission and make-up" of our flying fleets and their components are thoroughly explained. Lighter-than-air craft, too, are included.

The author, S. Paul Johnston, research coordinator for the National Advisory Committee for Aeronautics, as well as a lieutenant-commander in the Naval Reserve. Earlier this year another of his books—"Horizons Unlimited—A Graphic History of Aviation"—was published.

## FOCUS ON AFRICA

by Richard Upjohn Light. 228 pp. Illustrated. American Geographical Society, N. Y. 1941.

A private flyer here has produced an interesting and valuable study of Africa, as seen from his Bellanca *Skyrocket* six-place cabin monoplane. The text records not only a fine travel narrative, but an excellent historical and socio-economic background for points visited as well. The dozens of photographs include numerous truly splendid aerial shots.

The story of the flight itself—somewhat subordinated by the very mass of material presented—is one to give any pilot an incurable and immediate case of wanderlust. A final chapter on "The Scope of Aircraft in Africa" summarizes flight conditions and maps the route followed—from Capetown to Cairo and Ajaccio—in its entirety. This route map is especially interesting to the flyer because of its listing of photographs illustrating African flying conditions.

The flight described in this book was made during the winter of 1937-38. The author was pilot, with his wife serving as copilot, radio operator and photographer. Dr. Light is a Kalamazoo, Mich., physician. He has flown throughout the world.

## AIR PILOTING

by Virgil Simmons. 758 pp. Illustrated. Ronald Press Co., N. Y. 1941. $4.

A revised edition of the author's 1938 volume, this book is a complete manual of flight instruction. Practically every conceivable problem, from pilot qualifications to advanced maneuvers, instrument flying and aerial navigation, is considered. Especially helpful are the series of typical examination questions supplementing the chapters on the various ratings and special subjects. Illustrations show how various maneuvers should be performed, picture aircraft and equipment and clarify such topics as meteorology and navigation.

The author, Virgil Simmons, is civil flight training director at the Spartan School of Aeronautics. He is a former flying instructor at Boeing School and in the U. S. Army and Navy air services. His presentation is clear, to the point and boiled down to essentials. In the preface he states:

". . . my aim is specific: To illustrate and describe the best known means of developing pilot skill, and in addition to supply technical material, in text and question and answer form, which will definitely aid the applicant in passing the various written examinations."

## AVIATION FROM SHOP TO SKY

by John J. Floherty. 216 pp. Illustrated. J. B. Lippincott Co., Philadelphia. 1941. $2.

This book, a reporter's non-technical summarization of aviation's major phases, humanizes and dramatizes military, commercial and industrial branches alike. Special emphasis is placed on aviation's workers, be they factory hands or pilots. History is subordinated to current activities.

Chapter headings indicate the book's scope: "Horsepower and Manpower";

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He's in the Army now! Or perhaps it's the Navy, or the Marines! And of course you're going to take a photograph of him . . . many of them, indeed. But, remember—these snapshots are different. They are not the usual happy-go-lucky vacation or week-end photographs. They have a deeper, more permanent meaning. For some really "bang-up" tips on photographing the service man in uniform see page 24 of the Nov. POPULAR PHOTOGRAPHY.

**Want To Be A Military Photographer?**

How are the chances for an amateur photographer to follow his pet line of work in the Army? Is there a demand for military camera men? What are the qualifications for Army photographers? What is the organization of the Signal Photographic Company? What are the duties of each member? Lieut. Jack Drew of Wright Field brings you all the answers in a brilliantly illustrated article beginning on page 20 of the November POPULAR PHOTOGRAPHY. Don't miss it! . . . 26 other fascinating features and articles—all in the

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"Planes in the Making"; "Whirling Wings"; "Eaglets on the Wing"; "Parachute!"; "Wings Over the Sea"; "Commanders of the Air"; "Ports of the Sky"; and "Aviation Turns Schoolmaster." The excellent photographs which illustrate the volume are especially interesting.

All in all, this book would seem a fine introduction to its topic—"Aviation from Shop to Sky"—for the lay reader desiring a general picture of the field. Others, with more technical backgrounds, will find style, presentation and approach make it interesting reading.

---

**AIRCRAFT TEMPLATE DEVELOPMENT**
**compiled and edited by Aero Publishers, Inc. 312 pp. Illustrated. Aero Publishers, Inc., Glendale, Cal. 1941.**

Aircraft templates are guides or patterns, usually thin metal plates, used to check accuracy of parts or assemblies of parts. Making them naturally is a highly-skilled and important trade. This volume describes what the template maker does and how he does it. Aim of the book is to reduce time needed by student craftsmen to learn their trade and to help aircraft and parts manufacturers in their training programs.

Subsidiary topics covered include mathematics as they apply to template work, drafting, tools and equipment and many others. There is even a chapter devoted to suggestions to the ambitious apprentice who wants to advance himself.

---

**SAFETY IN FLIGHT**
**by Assen Jordanoff. 371 pp. Illustrated. Funk & Wagnalls Co., N. Y. 1941.**

Here is a book whose title summarizes its contents. The writer, a recognized aviation authority, discusses his subject from every angle. Weather and its effect on flying get intensive study. Radio, instruments, planes and their components and other topics also receive ample attention. Both local and cross-country flight are covered.

"Safety in Flight" is written in a simple, interesting style which makes every point clear. A series of cartoon stories, one after each of the first 13 chapters, illustrate safety maxims so amusingly you won't be able to resist looking them up long before you finish the book. Mr. Jordanoff certainly has succeeded in outlining the principles of safe flying for the average pilot.

---

**AIRCRAFT INSTRUMENTS**
**by George Ellis Irvin. 506 pp. Illustrated. McGraw-Hill Book Co., N. Y. 1941.**

President of the Irvin-Aircraft Instrument School and Irvin-Aircraft Mechanics Association, Mr. Irvin is in an excellent position to discuss his highly technical subject. His object has been to include material for a complete modern aircraft instruments course in one volume. Emphasis is on the practical, with series of illustrations not only portraying instruments of all types, but also in many cases showing how they are taken down and assembled. Many useful tables are included.

The volume's value is by no means limited to those taking formal courses in aircraft instruments, however. It should be of immense aid to anyone having anything to do with the use, maintenance, testing or repair of such devices. In all cases manufacturers' recommendations and airline procedures are followed. Both navigation and general field instruments are covered.

---

**FIT TO FLY**
**by Lt. Col. Malcolm C. Grow and Captain Harry G. Armstrong. 387 pp. Illustrated. D. Appleton-Century Co., N. Y. 1941. $2.50.**

This volume's sub-title is "A Medical Handbook for Flyers" and the book certainly fulfills this promise. The authors, both Army Medical Corps doctors, discuss the importance of various health problems from the aviator's, as well as the doctor's, standpoint. Medicine's role in aviation is summarized, after which consideration is given such topics as "Protecting Your Health," "Mental Hygiene," "Diseases of the Heart and Circulatory System," "Stimulants and the Airman," "Care of the Eye," "The General Physical Examination and Disqualifying Defects," "Protective Devices and Equipment" and a host of others. The various tests, the reasons for them and how they function, all are explained.

Maj. Gen. H. H. Arnold sums up "Fit to Fly" when, in his foreword, he states: "This book should perform an important service for the youth contemplating aviation, the younger, qualified airman and the veteran pilot, because it deals with the prevention of diseases important in relation to flying, the physical examination all aviators must take at frequent intervals, and those factors peculiar to aviation that tend to affect the lives and well being of all who venture into the air."

---

**PLANE FACTS FOR AIRPLANE AND ENGINE MECHANICS**
**by Bert A. Kutakoff. 241 pp. Illustrated. Military Book Co., N. Y. 1941. $1.75.**

"In this book the author has boiled down facts in a concise easy-to-understand question and answer form that will give the reader the how and why of the many tasks seasoned military and commercial aviation mechanics have taken years to master," says Walter Hinton in his foreword to Mr. Kutako's little volume. He sums it up well. The author, a former U. S. Navy aviator and engineering officer, dissects airplanes in singularly compact style. The final chapter is a glossary of aviation terms.

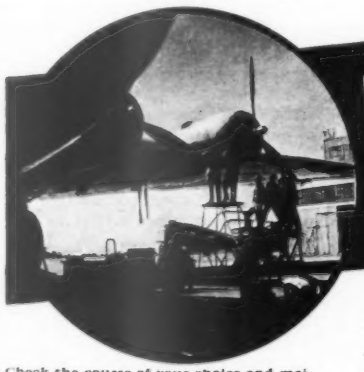
---

**THE ABC OF AVIATION**
**by Lieut. Col. Victor W. Page, U. S. Air Corps Res. 599 pp. Illustrated. Henley Publishing Co., N. Y. 1941. $2.50.**

Sub-titled "A Simplified Guide to Modern Aircraft," this volume describes all types of modern aircraft, their construction and operation. Instruments, engines and other plane components receive attention and the principles of inspection and trouble-shooting are outlined.

The fact that this is a revised and enlarged edition of Lieutenant Colonel Page's previous work of the same title indicates that the material has been well received. Also the author of the "Airplane Servicing Manual," "Aviation Engines" and other similar technical books, the colonel is a member of the Connecticut Advisory Board for Aeronautics.

END

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## U. S.-Canada Bases

(Continued from page 24)

times that number.

It was impossible to reach the Watson Lake base by road. The Canadian government built four flat-bottom motor boats and 15 scows in Vancouver. These were knocked down and shipped to Wrangell, Alaska. From there they were trans-shipped by river boat to Telegraph Creek and then hauled 75 miles to Dease Lake where they were re-assembled. They are now used to transport supplies down the Dease to the junction of the Liard River where a tractor train runs over the 25-mile route to Watson Lake.

Pan American and U. S. Army Air Corps engineers studied sub-zero flying operations under the guidance of Canadian bush flyers. At Prince George they had their first taste of real cold when the mercury dropped to 38° below zero. The Canadian engineers initiated them into the mysteries of oil dilution, whereby airplane engines can be started in the coldest weather without being warmed up. They learned about engine hoods and a dozen other cold weather tricks.

The northern air base chain will be ready before the snow flies this fall. Strict censorship prohibits the disclosure of details. But when the war is over and the real story is told there is a chance that the construction of the new fields will rank as an engineering achievment comparable to any anywhere.

Years have been compressed into months. The recent Russo-German developments have speeded the work. American bombers already have flown over the route to the big air base at Dutch Harbor, Alaska. Before this appears in print hundreds of American fighting planes will be on hand ready to repel any threat from the north.

END

## That's Not New . . .

(Continued from page 52)

objective and the probable approach direction of the bomber.

In action, the procedure would be something like this: Observers report enemy bombers headed for a concentrated attack on a particular position. They are moving in large numbers at five minute intervals, the altitude varying from 10 to 20,000 feet. Having established this fact, the Fighter Command instructs the screen-carriers to proceed to a position in front of the town, lower their screen and fly between two specified points.

When an enemy airplane strikes a cable, the extra load snaps the weak pin at a point at which the cable is attached to the winch hub. The cable withdraws a parachute in the auxiliary container thus permitting the entire cable to be lowered slowly, with the least possible damage to property below. If the wire is struck near the lower end, the grapnel will hook some part of the enemy aircraft and detonate the explosive. In the event that the enemy airplane strikes the wire, disconnecting it, and then manages to free itself without detonating the bomb, the parachute will allow the wire to descend slowly. This will cause the small plunger on the bottom of the canister to strike the ground first and disconnect the charge, rendering the explosive harmless.

The balloon barrage now has become as typical of London as Big Ben. The United States is beginning to follow suit. In Russia, in Turkey, even in Berlin, the sausage and wire are the first line of passive defense. The latest innovation is a flying sting ray with a 20,000-foot tail.

New ideas? Importation from abroad? Look up your patent records and your 1914 papers—it's an old Yankee concoction.

END

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## Airy Chat

(Continued from page 4)

service. There's no place on earth where a person can be sold on aviation more quickly than at a friendly airport. Many alert operators know this and today they have more business than they can handle. The advent of organizations like the Aircraft Owners and Pilots Association should hasten the trend toward friendly, courteous treatment at airports. But even the AOPA is having a tough time convincing some airport operators that they no longer are heroes-who-sail-the-mighty-heavens, but ordinary business men who will have to put out, if they expect to take in.

* * *

WHAT'S-IN-THE-WIND. Certain types of the latest American pursuit ships are being tested on floats as possible seaplane fighters. Although the British only admit to having lost two Boeing B-17C's to date, it is known that eight four-engined bombers were shot down over Europe between August 3 and 16. Fairchild recently got an Army contract for $4,746,951 worth of airplanes and parts, probably trainers. A new contract to Curtiss is for $28,150,924.56 worth of airplanes and spare parts.

Cessna and Fleetwings have received Army contracts for airplanes and spare parts in amounts of $12,043,865.47 and $4,555,614.77 respectively. TACA, the famed Honduran airline, operates 42 U. S. aircraft: 13 in Honduras, 13 in Nicaragua and 16 in Costa Rica. Bell Aircraft is reported to be turning out about 35 *Airacobras* (P-39) per week.

One of the biggest Army contracts for pursuit planes recently went to Bell: $75,218,384.40 for *Airacobras*.

Elaborate exercises of Air Force Combat Command units are being carried out during October. Intended to test the effectiveness of Eastern seaboard defense against air attack, the exercises will include operations by bombers, pursuits, antiaircraft and searchlights and the newly organized Aircraft Warning Service. The latter is primarily a civilian organization; in these exercises it will function areas 150 miles from the seacoast.

How many passengers do the airlines carry in one month? Statistics for a recent month: American, 113,607; United Air Lines, 55,289; Eastern Air Lines, 43,970; TWA, 43,540; Pennsylvania-Central, 31,851. There are 2,284 airports and 361 seaplane bases in the United States. Newest military lightplane is the Aeronca YO-58, a number of which have been ordered by the Army. It would cost you $1.65 per mile to charter a Boeing *Stratoliner*, 80 cents per mile for a Douglas DC-3, 65 cents for a DC-2 or Lockheed *Lodestar* and 50 cents for a Lockheed *Electra* or a Boeing 247D. Then, if you want the plane to wait for you while you finish your visit, you will have to pay $10 per hour layover charges.

* * *

Personally, we'd be fidgety.

MAX KARANT.

END

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| Ashcraft Bro's Flying Service, Munic. Arpt., Lawrence, Kansas | Chief Cont. 65 | 526 hr. | Never | 1750 |
| Ashcraft Bro's Flying Service, Munic. Arpt., Lawrence, Kansas | Chief Cont. 65 | 651 hr. | Never | 1750 |
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| Leeward Aviation, New Kensington, Pa. | Chief 1939 Cont. 65 | 60 hr. | New | 1450 |
| Sky Harbor, Inc., R.R. No. 11 Box 551, Indianapolis, Indiana | Lyc. 65 | 550 hr. | Topped 450 hr. | 1400 |
| Lenhart Flying Serv., Arpt., Marion, Ind. | TF Frnkln. 65 | 12 hr. | | 1395 |
| Morristown Fly. Club, Morrristown, Tenn. | Chief '40 Lyc. 65 | 362 hr. | No | 1375 |
| Mountain States Aviation, Inc. 3800 Dahlia, Denver, Colo. | Chief Cont. | 980 hr. | Just 450 hr. | 1350 |
| Geo. T. Webb, Oneida, Tenn. | Chief Lyc. 65 | 370 hr. | | 1300 |
| Cincinnati Arcft. Serv., Lunken Arpt., Cinn., O. | TL 65 Lyc. 65 | 285 hr. | Never | 1300 |
| Lane Air Service, Albany, Ga. | Chief Deluxe Cont. 65 | 375 hr. | Recently | 1300 |
| Florida Aero & Supply Co., Cannon-Mills Fld., Orlando, Florida | Tandem Trainer Lyc. 65 | 280 hr. | No | 1300 |
| Lenhart Flying Serv., Arpt., Marion, Ind. | TL Lyc. 65 | 176 hr. | | 1295 |
| C. W. Peterson, Munic. Arpt., Salina, Kans. | Chief Cont. 65 | 350 hr. | Never | 1250 |
| Lenhart Flying Serv., Arpt., Marion, Ind. | TL Lyc. 65 | 192 hr. | | 1250 |
| Inter-City Avia., Inc., Boston Munic. Arpt., E. Boston, Mass. | Chief Lyc. 65 | 825 hr. | 210 hr. | 1250 |
| Pierce Flying Serv., Box 894, Eureka, Calif. | 65-TC Cont. 65 | 650 hr. | 100 hr. | 1250 |
| Tred Avon Flying Serv., Inc., Easton, Md. | Trainer Lyc. 50 | 236 hr. | No | 1238 |
| Richmond Air Transp., Byrd Arpt., Richmond, Va. | Chief Cont. 50 | 510 hr. | 30 hr. | 1200 |
| St. Louis Flying Serv., Lambert Field, Robertson, Mo. | KCA Cont. 50 | | Recently | 1175 |
| Tred Avon Flying Serv., Inc., Easton, Md. | Trainer Lyc. 55 | 337 hr. | No | 1152 |
| Blvd. Arpt., Inc., Roosevelt Blvd., Phila, Pa. | TL Lyc. 55 | 150 hr. | No | 1150 |
| Jenkins Air. Serv., Inc., Munic. Arpt., Rochester, N. Y. | TL Lyc. 65 | 200 hr. | | 1150 |
| Springfield Avia. Co., Munic. Arpt., Springfield, Illinois | Tandem Tr. Frnkln. 60 | 303 hr. | No | 1150 |
| Boulevard Airport, Inc., Roosevelt Blvd., Philadelphia, Pa. | Trainer Lyc. 55 | 200 hr. | No | 1100 |
| Lexington Fly. Serv., Inc., Lexington, Ky. | Chief Frnkln. 50 | 281 hr. | Topped | 1100 |
| Art Whitaker, Swan Island Arpt., Portland, Oregon | Trainer Lyc. 65 | 700 hr. | 500 hr. | 1075 |
| United Aero Corp., P.O. Box 222, San Antonio, Texas | Chief Lyc. 50 | 550 hr. | 550 hr. | 1025 |
| Cedar Rapids Arwys., Inc., Cedar Rapids, Ia. | TF Frnkln. 60 | 565 hr. | 160 hr. | 1005 |
| Richmond Air Transport, Byrd Arpt., Richmond, Va. | 60TF Frnkln. 60 | 355 hr. | | 1000 |
| Mountain States Aviation, 3800 Dahlia, Denver, Colo. | Chief Cont. 65 | 1250 hr. | Just 335 hr. | 1100 |
| Edwards Flying Service, Flushing Airport, Flushing, L. I. | 50C Cont. 50 | 750 hr. | 150 hr. | 950 |
| Inter City Aviation, Inc., East Boston Airport, East Boston, Mass. | Chief Lyc. 50 | 630 hr. | 180 hr. | 950 |
| Lenhart Flying Serv., Arpt., Marion, Ind. | TF Frnkln. 60 | 365 hr. | 310 hr. | 950 |
| Midwest Flyers Lakeside Arpt., E. St. Louis, Ill. | Trainer Frnkln. 60 | 550 hr. | Jan. '41 | 950 |
| R. D. Finefrock, Box 301, Tyler, Texas | Chief '38 Cont. 50 | 500 hr. | Just relic. | 950 |
| Tri-State Aviation Corp., Cincinnati Arpt., Sharonville, Ohio | Frnkln. 60 | 511 hr. | | 940 |
| O'Neal Aircraft Co., O'Neal Arpt., Vincennes, Ind. | Le 65 Lyc. 65 | 1100 hr. | 950 hr. | 900 |
| United Aero Corp., P.O Box 222, San Antonio, Texas | Trainer Lyc. 50 | 1008 hr. | 445 hr. | 900 |
| Tri-State Aviation Corp., Cincinnati Airport, Sharonville Ohio | TF Frnkln. 60 | 622 hr. | Will maior | 900 |
| Jenkins Air Serv., Inc., Munic. Arpt., Rochester, N. Y. | TF Frnkln. 60 | 620 hr. | Maior 576 hr. | 900 |
| Southern Arwys. Sales Co., Munic. Arpt., Birmingham, Ala. | '38 Cont. 50 | 300 hr. | 290 hr. | 900 |
| St. Louis Flying Serv., Lambert Fld., Robertson, Missouri | KCA Cont. A-50 | 974 hr. | 5 hr. | 885 |
| C. W. Peterson, Munic. Arpt., Salina, Kansas | LB LeBlond 90 | 575 hr. | 200 hr. | 880 |
| United Aero Corp. P.O. Box 222, San Antonio, Texas | Trainer Frnkln. 60 | 1250 hr. | 200 hr. | 875 |
| Jones Fly. Serv., Sullivan Av. Arpt., Cols., O. | K Frnkln. 50 | 680 hr. | Fact. 150 hr. | 875 |
| Tri-State Aviation Corp. Cincinnati Arpt., Sharonville, Ohio | Frnkln. 60 | 605 hr. | | $850 |
| Southern Arwys., Mun. Arpt., Birmingham, Ala. | Cont. 50 | 360 hr. | 350 hr. | 850 |
| Tri-State Aviation Corp., Cincinnati Arpt., Sharonville, Ohio | Frnkln. 60 | 715 hr. | 688 hr. | 840 |
| Tri-State Aviation Corp., Cincinnati Arpt., Sharonville Ohio | TF Frnkln. 60 | 798 hr. | Just | 800 |
| Tri-State Aviation Corp., Cincinnati Arpt., Sharonville, Ohio | TF Frnkln. 60 | 952 hr. | 164 hr. | 775 |
| Howard G. Mayes, P.O. Box 2104, Huntington, W. Va. | Cont. 50 | 729 hr. | Never | 750 |
| Portland Flying Serv., Inc., Municipal Airport, Portland, Maine | Chief Struts Edo Floats | | | 700 |
| Lester Pierce, 2135 Broadway, Eureka, Calif. | C3 Aeronca 36 | 1430 hr. | Just modernized | 600 |
| Aircraft Assoc., Inc., Munic. Arpt., Long Beach, Calif. | K Aeronca 40 | 837 hr. | 59 hr. since | 600 |
| Aero-Ways, Inc., Munic. Arpt., Cleveland, O. | K Aeronca 40 | 328 hr. | Just relic | 600 |
| St. Louis Flying Service, Lambert Field, Robertson, Mo. | K Air Cooled | 1112 hr. | 130 hr. | 550 |
| Hawthorne Flying Service, Municipal Airport, Charleston, S. C. | K 40 | 583 hr. | 583 hr. | 500 |
| **ARROW SPORT** | | | | |
| Ray R. Taylor, Meacham Field, Fort Worth, Texas | Ford V-8 75 | 233 hr. | Just | 550 |
| Aero-Ways, Inc., Munic. Arpt., Cleveland, O. | Sport V8 | 520 hr. | | 525 |
| McInnis Aviation Service, Inc., Municipal Airport, Minneapolis, Minn. | Converted V8 85 h.p. | 229 hr. | | 500 |
| Blvd. Arpt., Inc., Roosevelt Blvd., Phila., Pa. | Arrow Sport V8 82 h.p. | 450 hr. | 90 hr. | 500 |
| **BEECHCRAFT** | | | | |
| Colorado Aviation Company, 426 U.S. Nat'l Bank Bldg., Denver, Colo. | Jacoas 285 | 700 hr. | 160 hr. | 6000 |
| Colorado Aviation Company, 426 U.S. Nat'l Bank Bldg., Denver, Colo. | Jacobs | 800 hr. | Just | 5350 |
| E. W. Wiggins Arwys., Inc., Providence R. I. | C-17-B Jacobs 285 | 600 hr. | Recently | 4800 |
| **BELLANCA** | | | | |
| Art Whitaker, Box 3820, Portland, Ore. | Cruisair Ken Royce 90 | 95 hr. | None since top | 3500 |
| **BIRD** | | | | |
| Lane Air Serv., Albany, Georgia | Deluxe Kinner 100 h.p. | 900 hr. | Just | 1250 |
| Edwards Flying Service, Inc., Flushing Airport, Flushing, L. I., N. Y. | 125 Kinner | | 75 hr. | 1200 |
| Florida Aero & Supply Co., Cannon-Mills Fld., Orlando, Florida | Kinner 90 h.p. | 1500 hr. | 250 hr. | 795 |
| **CESSNA** | | | | |
| Tri-State Aviation Corp., Cincinnati Airport, Sharonville, Ohio | Airmaste Warner 145 | 265 hr. | 255 hr. | 4850 |
| Hubert & Dillon Air Serv., Box 177-S, Tacoma, Wash. | C-145 Warner 145 | 475 hr. | ship be'g majored | 2950 |
| Leon D. Sherrick, McKinley Airport, Canton, O. | Wright J-6-7 | 600 hr. | 100 hr. | 1150 |
| **CULVER** | | | | |
| Tri-State Aviation Corp., Cincinnati Arpt., Sharonville Ohio | Cont. 75 | 25 hr. | | 2000 |
| New Mexico Flying Serv. Box 67, Clovis, N.M. | LCA Cont. 75 | 92 hr. | No | 1850 |
| **CURTISS ROBIN** | | | | |
| Johnson Fly. Serv., Inc., Missoula, Mont. | 4 place Chall. 185 | 800 hr. | 2 hr. | 875 |
| Red Bank Airport, Inc., Red Bank, N. J. | Chall. 185 | 575 hr. | 162 hr. | 650 |
| Thompson Flying Service, Salt Lake Airport, Salt Lake City, Utah | Chall. 185 | 1250 hr. | 160 hr. | 720 |

# FLYING and POPULAR AVIATION USED PLANE LISTING OF

| DEALERS | MODEL AND ENGINE | | TIME | OVER-HAULED | PRICE |
|---|---|---|---|---|---|
| **CURTISS WRIGHT** | | | | | |
| Foster A. Lane, Port Columbus Flying School, Columbus, Ohio | | Gypsy 90 h.p. | 600 hr. | 50 hr. | $775 |
| **DART** | | | | | |
| Dethloff Flying Service, Euclid Avenue Airport, Willoughby, Ohio | 1939 | LeBlond 90 | 250 hr. | 100 hr. | 2150 |
| Ashcraft Bros. Fly. Serv., Munic Arpt., Lawrence, Kansas | Dart | Ken Royce 90 | 360 hr. | 300 hr. top over'hl. | 2000 |
| **DAVIS** | | | | | |
| Dethloff Flying Service, Euclid Avenue Airport, Willoughby, Ohio | | eBlond 90 | 235 hr. | 50 hr. | 2000 |
| Capt. Arthur J. Davis, East Lansing, East Lansing, Michigan | | Warner 125 | 137 hr. | None | 900 |
| **FAIRCHILD** | | | | | |
| Northway Fly. Serv., Norton Fld., Columbus, O. | | Warner 145 | 185 hr. | None | 6250 |
| F. W. Schrom Schrom Airport, Berwyn, Maryland | 24 4 PCLM | Warner 125 | 490 hr. | Just | 4000 |
| Thomas Metcalf, Toledo Mun. Arpt., Toledo, O. | 24 | Warner 145 | 356 hr. | Topped 306 hr. | 3975 |
| T. A. Colbertson, Medford, Oregon | 246 | Warner 145 | 800 hr. | 350 hr. | 3500 |
| Jos. R. Higgins, Mozart Park, Wheeling, W.Va. | 24 | Ranger 145 | 790 hr. | 10 hr. | 2500 |
| E. H. Brockenbrough, Munic. Arpt., Charlotte, N. C. | 24 | Warner 145 | 350 hr. | Just | 2395 |
| Standard Flying Serv. Inc., Somerset Hills Airport, Basking Ridge, N. J. | 24 | Warner 145 | 485 hr. | | 2150 |
| Aircraft Assoc., Inc., Munic. Arpt., Long Beach, Calif. | 71 | Wasp SC-1 450 h.p. | 3184 hr. | 447 hr. | 2000 |
| John P. Hall, West Haven Arpt., West Haven, Conn. | 24 | Warner 145 | 348 hr. | Recently | 1650 |
| Art Whitaker, Box 3820, Portland, Ore. | 24 | Cirrus 100 | 1200 hr. | None since Maior | 1125 |
| Doug Schall, Inc., 33 Clagett Rd., Hyattsville, Md. | KR34 | Wright J65 185 h.p. | 700 hr. | 16 hr. | 1050 |
| **FLEET** | | | | | |
| Johnson Flying Serv., Inc., Missoula, Mont. | 9 | Kinner 125 | 1200 hr. | 100 hr. | 1750 |
| West Coast Aircft., L.A. Munic. Arpt., Inglewood, Calif. | 2 | Kinner 100 | | Just | 1550 |
| Granite State Airways, Manchester Arpt., Manchester, N.H. | 2 | Kinner 100 | 1300 hr. | 1125 hr. | 1200 |
| White Fly. Serv., Inc., Caldwell-Wright Arpt., Caldwell, N.J. | | Warner 125 | 1090 hr. | 8 40 | 1095 |
| St. Louis Flying Service, Lambert Field, Robertson, Mo. | Warner Scarab S | | 801 hr. | 161 hr. | 695 |
| **FUNK** | | | | | |
| Island Crop Dusting Co., Airport Caribou, Me. | 75B | | 150 hr. | at 130 hr. | 1300 |
| **KINNER** | | | | | |
| Schneider Aero Serv., Chandler Fld., Fresno, Calif. | Sportwing | Kinner 125 | 1303 hr. | 450 hr. | 1105 |
| **LAMBERT** | | | | | |
| Al Guthrie, Stillwater Box 466, Stillwater, Okla. | 90 | | 800 hr. | 5 hr. | 650 |
| **LOCKHEED** | | | | | |
| H. A. Hammill, Box 992, Austin, Texas | | Wasp 450 | | 8 hr. | 5000 |
| **LUSCOMBE** | | | | | |
| Knox Flite, Municipal Airport, Knoxville, Tenn. | Phantom Warner 145 | | 221 hr. | 11 hr. | 3500 |
| Carl Evers, 247 Park Ave., N.Y., N.Y. | Silvaire 75 Cont 75 | | | | 2650 |
| W. F. Luke, Schenectady City Arpt., Schenectady, N. Y. | Silvaire 8.C Cont. A.75 | | 70 hr. | | 2400 |
| Falcon Aircraft Corp., L.A. Mun. Arpt., Inglewood, Calif. | 8A | Cont. 65 | 350 hr. | | 2200 |
| C. W. Peterson, Mun. Arpt., Salina, Kansas | 8A | Cont. 65 | 100 hr. | None | 2000 |
| C. W. Peterson, Mun. Arpt., Salina, Kansas | 8A | Cont. 65 | 100 hr. | Never | 1950 |
| Air Serv. Inc., Mun. Arpt. Denver, Colo. | 8A | Cont. 65 | 84 hr. | | 1850 |
| Midwest Fly. Serv., La Grange, Ill. | 8A | Cont. 65 Dual | 125 hr. | None | 1850 |
| Aircraft Associates, Inc., Municipal Airport, Long Beach, Calif. | 8 | Cont. 65 | 500 hr. | 35 hr. | 1800 |
| W. F. Luke, Schenectady County Arpt., Schenectady, N. Y. | 8A | Cont 65 | 113 hr. | | 1800 |
| Doug Schall, Inc., 33 Clagett Rd., Hyattsville, Maryland | 8B1 | Lycoming 65 | 30 hr. | New | 1790 |
| Midwest Fly. Service, La Grange, Illinois | 8A | Cont. 65 | 225 hr. | None | 1700 |
| Aircraft Sales of Mich., City Arpt., Detroit, Mich. | 8-A-J | Cont. 65 | 780 hr. | 220 hr. | $1695 |
| J. L. Wells, 106 W. Main, Avon Park, Fla. | 8A | Cont. 65 | 95 hr. | None | 1675 |
| Aircraft Unlimited, Inc. Roosevelt Field, Mineola, New York | | Cont. 65 Dual | 213 hr. | No | 1650 |
| Aircraft Sales of Michigan, Municipal Airport, Detroit, Michigan | 8A-J | Cont. 65 injector | 700 hr. | 125 hr. | 1650 |
| Upton & Bowen, West Memphis, Ark. | 8A | Cont. 65 | 300 hr. | 50 hr. | 1600 |
| Midwest Fly. Serv., La Grange, Illinois | 8B1 | Lycoming 65 | 150 hr. | None | 1600 |
| W. F. Luke, Schenectady County Arpt., Schenectady, N. Y. | 8A | Cont. 65 | 350 hr. | 50 hr. | 1550 |
| Knox Flite, Municipal Arpt., Knoxville, Tenn. | 8A | Cont. 65 | 450 hr. | App 50 | 1500 |
| Thompson Fly. Serv., Inc., Salt Lake City, Utah | 8A | Cont. 65 | 753 hr. | | 1475 |
| Knox Flite, Municipal Arpt., Knoxville, Tenn. | 8B | Luc. 65 | 517 hr. | Just | 1400 |
| Thompson Flying Serv., Inc., Salt Lake City, U. | 8A | Cont. 65 | 683 hr. | 79 hr. | 1375 |
| Doug Schall, Inc., 33 Clagett Rd., Hyattsville, Maryland | 8 | Cont. 50 | Motor | 100 hr. | 1300 |
| Aircraft Unlimited, Inc., Roosevelt Field, Mineola, N. Y. | | Cont. 50 | 374 hr. | Just Majored | 1250 |
| Knox Flite, Municipal Arpt., Knoxville, Tenn. | 8 | Cont. 55 | 500 hr. | 200 hr | 1200 |
| Aircraft Unlimited, Inc., Roosevelt Field, Mineola, New York | | Cont 50 | 374 hr. | Just Topped | 1050 |
| Albert E. Padags, Tri-City Airport, Wis. Rapids, Wisc. | 8 | Cont. 55 | 430 hr. | 415 hr. | 1000 |
| **MONOCOUPE** | | | | | |
| Fla. Aero & Supply Co., Cannon-Mills Fld., Orlando, Florida | | Warner 125 | 945 hr. | 240 hr. | 1250 |
| Leon D. Sherrick, McKinley Arpt., Canton, O. | | Warner 125 | 750 hr. | 75 hr. | 1200 |
| Florida Aero and Supply Co., Cannon Mills Field, Orlando, Florida | 110 | Warner 125 | 530 hr. | 250 hr. | 1150 |
| St. Louis Flying Service, Lambert Field, Robertson, Mo. | | Lambert R-266 | 1000 hr. | Unknown | 885 |
| **NEW STANDARD** | | | | | |
| O'Neal Aircraft Co., O'Neal Arpt., Vincennes, Indiana | | Wright J5 | 720 hr. | 700 hr. | 1100 |
| Boulevard Arpt., Inc., Roosevelt Boulevard, Philadelphia, Pa. | | Kinner 90 | 1500 hr. | 700 hr. | 700 |
| **PIPER CUB** | | | | | |
| E. H. Brockenbrough, Mun. Arpt., Charlotte, N. C. | J4 | Cont. 65 '40 | 70 hr. | None | 2200 |
| Madison Flying Serv., Route 1, Madison, Ind. | J4 | Cont. 75 | 65 hr. | | 2000 |
| Piedmont Aviation, Inc., Municipal Airport, Winston-Salem, N. C. | 1941 | Cont. 75 Dual | 185 hr. | 85 hr. | 1950 |
| Piedmont Aviation, Inc., Municipal Airport, Winston-Salem, N. C. | Coupe 1940 | Cont. 65 Dual | 43 hr. | None | 1950 |
| Stiles Motor Co., 260 Main St., Northport, N.Y. | Coupe J4A | Cont. 65 | 142 hr. | New | 1900 |
| L. L. Rupert, Box 446, Muskogee, Okla. | Coupe '40 | Cont. Dual 65 | 155 hr. | | 1850 |
| Philadelphia Skyport inc., Pier Three South, Philadelphia, Pa. | Seaplane | Cont. 65 | 151 hr. | Never | 1825 |
| L-H Air Serv., Inc., Hatboro Arpt., Hatboro, Pa. | | Cont. 65 | 125 hr. | | 1800 |
| Lynn B. Fellison, 2811 Mulberry, St Joseph, Mo. | J5 | Cont. 75 | 83 hr. | New | 1765 |
| Northway Flying Service Norton Field, Columbus, Ohio | Cruiser | Cont. 75 | 155 hr. | Like New | 1750 |
| J. L. Schroeder, Inc., Box 8055, Houston, Tex. | J4 '40 | Cont. 65 | 93 hr. | None | 1750 |
| Southern Vt. Fly. Serv., Arpt., N. Springfield, Vt. | Cruiser | Cont. 75 | 40 hr. | New | 1750 |
| Lane Air Service, Albany, Georgia | Cruiser | Cont. 75 | 142 hr. | New Ship | 1700 |
| Dubois Avia. Assoc., Mun. Arpt., DuBois, Pa. | J4 '40 | Cont. 65 | 97 hr. | | 1700 |
| McVey Flying Service, Monmouth, Illinois | J5A | Cont. 75 | 305 hr. | | 1700 |
| McBoyle Cub Sales, Arpt., Lake Delton, Wisc. | J5 | Cont. 75 | 65 hr. | New | 1675 |
| Susquehanna Air Service, Williamsport Airport, Montainville, Pa. | Coupe | Lyc. 65 | 85 hr. | Never | 1650 |
| Rudy Pickrul, Traverse City Arpt., Traverse City, Michigan | Coupe '40 | Cont. 65 Dual | 62 hr. | | 1650 |
| Philadelphia Skyport, inc., Pier Three South, Philadelphia, Pa. | Seaplane | Cont. 65 | 774 hr. | 90 hr. | 1650 |
| Herman L. Martin, Munic. Arpt., Walla Walla, Wash. | J4 | Cont. 65 | 450 hr. | 25 hr. | 1600 |
| Philadelphia Skyport, inc., Pier 3 South, Philadelphia, Pa. | Seaplane | Cont. 65 | 470 hr. | 280 hr. | 1575 |
| Racine Fly. Serv., Racine Arpt., Racine, Wisc. | J-4 | Cont. 65 | 383 hr. | 353 hr. | 1575 |
| Barr Aviation Corp., Detroit City Arpt., Detroit, Michigan | J4 Coupe | Cont. 65 | 175 hr. | None | 1550 |
| Southern Air Serv., Memphis, Tenn. | | Cont. 65 | 100 hr. | New | 1550 |
| Philadelphia Skyport Inc., Pier 3 South, Philadelphia, Pa. | Seaplane | Cont. 65 | 474 hr. | 221 hr. | 1525 |
| E. H. Brockenbrough, Mun. Arpt., Charlotte, N. C. | J4 '40 | Cont. 65 | 200 hr. | 200 hr. | 1500 |
| Al Gillis Fly. Serv., 125 1st Ave., No., Great Falls, Mont. | Coupe '40 | Cont. 65 | 350 hr. | None | 1500 |
| Desjardin Auto Serv., 24 Fairmount Ave., Worcester, Mass. | J-5 | Cont. 75 | 100 hr. | New | 1500 |
| Seidner Flying Service, Ralph Seidner, Jr., S.A.M. Airport, Youngstown, Ohio | Coupe | Cont. 65 | 250 hr. | Recently | 1495 |
| Racine Fly. Serv., Racine Arpt., Racine, Wis. | J-4 | Lyc. 65 | 330 hr. | top 320 | 1475 |
| Inter City Aviation, Inc., East Boston Airport, East Boston, Mass. | Coupe | Cont. 65 | 200 hr. | | 1450 |
| J. L. Schroeder, Inc., Box 8055, Houston, Tex. | J3 | Cont. 65 | 98 hr. | None | 1440 |
| Al Gillis Flying Service, P. O. Box 1806, Great Falls, Mont. | Coupe '40 | Cont. 65 | 700 hr. | Just | 1400 |

# AUTHORIZED AIRCRAFT DEALERS

| DEALERS | MODEL AND ENGINE | | TIME | OVER-HAULED | PRICE |
|---|---|---|---|---|---|
| Lynchburg Air Trans. and Sales Corp., Preston Glenn Airport, Lynchburg, Va. | Coupe '39 | Cont. 65 | 275 hr. | Never | $1400 |
| Lexington Fly. Serv., Munic. Arpt., Lexington, Ky. | J5 | Cont. 75 | 230 hr. | | 1400 |
| Reliable Fly. Serv., P.O. Box 1303, Bristol, Conn. | J-4 | Cont. 65 | 140 hr. | 30 hr. fact. maj. | 1400 |
| J. L. Schroeder, Inc., Box 8055, Houston, Tex. | J3 | Frnkln. 65 | 142 hr. | None | 1375 |
| Lynchburg Air Transport & Sales Corp., Preston Glenn Arpt., Lynchburg, Va. | Coupe | Cont. 65 | 200 hr. | No | 1350 |
| Dethloff Flying Service, Euclid Avenue Airport, Willoughby, Ohio | J3 | Lyc. 65 | 150 hr. | None | 1369 |
| Philadelphia Skyport, Inc., Pier 3 South, Philadelphia, Pa. | Seaplane | Cont. 65 | 976 hr. | 740 hr. | 1350 |
| Philadelphia Skyport, Inc., Pier 3 South, Philadelphia, Pa. | Seaplane | Cont. 65 | 984 hr. | 230 hr. | 1350 |
| Virginia Cub Distributors, Box 211, Farmville, Va. | J3 | Lyc. 65 | 145 hr. | | 1350 |
| Southern Vt. Fly. Serv., Arpt., Springfield, Vt. | J3L '40 | Lyc. 65 | 162 hr. | New | 1350 |
| Dethloff Flying Service, Euclid Avenue Airport, Willoughby, Ohio | J3 | Frnkln. 65 | 100 hr. | None | 1325 |
| Philadelphia Skyport, Inc., Pier Three South, Philadelphia, Pa. | J-3 | Cont. 65 Dual | 247 hr. | | 1325 |
| TriCities Avia. Sch., TriCities Arpt., Endicott, N. Y. | J4 '39 | Cont. 65 | 500 hr. | | 1300 |
| Dethloff Flying Service, Euclid Avenue Airport, Willoughby, Ohio | | Lyc. 65 | 100 hr. | No | 1295 |
| Inter City Aviation, Inc., East Boston Airport, East Boston, Mass. | Tandem | Cont. 65 | 550 hr. | | 1275 |
| J. L. Schroeder, Inc., Houston Main St. Arpt., Houston, Texas | J-3 Trainer | Frnkln. 65 | 169 hr. | No | 1275 |
| Southern Arwys. of Danville, Box 205, Danville, Va. | J-3 | Cont. 65 | 385 hr. | Never | 1275 |
| Southern Vt. Fly. Serv., Arpt., N. Springfield, Vt. | J3L '40 | Lyc. 65 | 280 hr. | New | 1250 |
| Madison Fly. Serv., R. I., Madison, Ind. | J3L | Lyc. 65 | 205 hr. | No | 1235 |
| Al Gillis Flying Service, P.O. Box 1806, Great Falls, Mont. | '40 J3F 65 | Frnkln. 65 | 750 hr. | Just | 1200 |
| Mangen F. Warrington, Cub Fly. Serv., Selbyville, Del. | J3 '39 | Cont. 55 Dual | 40 hr. | No | 1200 |
| John Ruzicks, Airport, Peru, Ind. | J3 | Frnkln. 65 | 140 hr. | No | 1225 |
| Desjardin Auto Serv., 24 Fairmount Ave., Worcester, Mass. | J-4 | Cont. 65 | 550 hr. | 400 hr. | 1200 |
| Galbraith Air Serv., Munic. Arpt., Paducah, Ky. | J3L | Lyc. 65 | 102 hr. | No | 1195 |
| Piedmont Avia., Inc., Mun. Arpt., Winston-Salem, N. C. | J4 '39 | Cont. 65 | 385 hr. | 75 hr. | 1125 |
| L-H Air Serv. Inc., Hatboro Arpt., Hatboro, Pa. | J3 | Cont. 65 | 500 hr. | 500 hr. | 1100 |
| Virginia Cub Distributors, Box 211, Farmville, Va. | J3 | Lyc. 65 | 515 hr. | Yes | 1100 |
| Aviation Serv., Inc., Box 408, Newport News, Va. | J3L | Lyc. 65 | 528 hr. | None | 1100 |
| Madison Fly. Serv, R. No. 1, Madison, Ind. | Coupe | Cont. 65 | 335 hr. | No | 1100 |
| Piedmont Aviation, Inc., Municipal Arpt., Winston-Salem, N. C. | Coupe | Cont. 65 dual | 432 hr. | 112 hr. | 1085 |
| South Arwys. of Danville, Box 205, Danville, Va. | J-3 | Lyc. 55 | 570 hr. | Never | 1075 |
| L-H Air Service, Inc., Hatboro Airport, Hatboro, Pa. | J3 | Lyc. 65 | 350 hr. | | 1050 |
| Des Moines Flying Serv., Municipal Arpt., Des Moines, Ia. | J3 | Frnkln. 65 | 500 hr. | None | 1050 |
| Gerald Gallagher, 4507 Marvine Ave., Drexel Hill, Pa. | J-3 | Cont. 65 | 720 hr. | 95 hr. | 1050 |
| J. L. Schroeder, Inc., Houston Main St. Arpt., Houston, Texas | J-3 | Cont. 65 | 596 hr. | Yes | 1050 |
| Towners Fly. Serv., Towanda Arpt., Towanda, Pennsylvania | J-3-40 | Lyc. 65 | 388 hr. | None | 1050 |
| Inter-City Fly. Serv., Mun. Arpt., Ft. Wayne, Ind. | J3 '40 | Frnkln. 65 | 456 hr. | | 1050 |
| Palo Alto Arpt., Inc., Box 640, Palo Alto, Cal. | | Cont. 65 | 1203 hr. | 250 hr. | 1000 |
| Madison Flying Service, Route 1, Madison, Ind. | J3L65 | Lyc. 65 | 700 hr. | 125 hr. | $1000 |
| Northway Flying Service, Norton Field, Columbus, Ohio | J3 | Frnkln. 65 | 650 hr. | 125 hr. | 1000 |
| Zimmerly Brothers Air Transport, Box 266, Lewiston, Idaho | | Cont. 50 | 1300 hr. | 90 hr. | 1000 |
| Spann Fly. Serv., Mun. Arpt., Colorado Springs, Colo. | J4 | Cont. 65 | 650 hr. | 200 hr. | 1000 |
| Richmond Air Trans., Byrd Arpt., Richmond, Va. | J3 | Frnkln. 60 | 530 hr. | 215 hr. | 1000 |
| Midwest Avia. Corp., Norton Fld., Columbus, O. | Coupe | Frnkln. 60 | 600 hr. | | 1000 |
| Stillwater Fly. Serv., Box 466, Stillwater, Okla. | J3C | Cont. A50-5 | 1073 hr. | N'w eng. | 1000 |
| L. L. Rupert, Box 446, Muskogee, Okla. | J3F '40 | Frnkln. 50 | 150 hr. | like new | 1000 |
| Midwest Flyers, Lakeside Arpt., E. St. Louis, Ill. | J3F | Frnkln. 60 | 350 hr. | None | 995 |
| Mid-Western Avia. Co., 406 Kirkpatrick Bldg., St. Joseph, Mo. | J-3 | Frnkln. 50 | 1230 hr. | Just | 985 |
| Susquehanna Air Service, Williamsport Airport Montoursville, Pa. | J-3 Trainer | Lyc. 65 | 125 hr. | Never | 975 |
| Galbraith Air Serv., Munic. Arpt., Paducah, Ky. | J3F | Frnkln. 50 | 398 hr. | No | 975 |
| Ben C. Arquitt Mun. Arpt., Lima, Ohio | J3 | Frnkln. 60 | 314 hr. | 272 hr. | 970 |
| Consolidated Air Serv., Rubinkam Arpt., Harvey, Illinois | J3 | Frnkln. 60 | 570 hr. | None | 950 |
| Herman L. Martin, Mun. Arpt., Walla Walla, Wash. | J3 | Frnkln. 50 | 1100 hr. | 50 hr. | 950 |
| Ray Wilson, Inc., Park Hill Arpt., Denver, Colo. | J-3 | Frnkln. 50 | 830 hr. | mjr. 750 hrs. | 950 |
| Inter-City Flying Service, Municipal Arpt., Ft. Wayne, Indiana | J3 | Frnkln. 50 | 246 hr. | | 925 |
| G. L. Williams, Syracuse Arpt., Syracuse, N. Y. | J3 | Frnkln. 60 | 998 hr. | Recent | 925 |
| L-H Air Service, Inc., Hatboro Airport, Hatboro, Pa. | J-3 | Lyc. 55 | 1050 hr. | 50 hr. | 900 |
| Zimmerly Brothers Air Transport, Box 266, Lewiston, Ida. | | Frnkln. 50 | 1500 hr. | 50 hr. | 900 |
| Palo Alto Arpt., Inc., Box 640, Palo Alto, Calif. | | Cont. 50 | 1416 hr. | 518 hr. | 900 |
| Russ Walling, Walling-Watertown Arpt., Watertown, N. Y. | J3 | Frnkln. 50 | 925 hr. | 500 hr. | 900 |
| Avia. Serv., Inc., Box 408, Newport News, Va. | J3L | Lyc. 55 | 550 hr. | None | 900 |
| Consolidated Air Serv., Rubinkam Arpt., Harvey, Illinois | J3 | Frnkln. 60 | 720 hr. | None | 900 |
| Desjardin Auto Serv., 24 Fairmount Ave., Worcester, Mass. | J-3 | Lyc. 55 | 900 hr. | 700 hr. | 900 |
| Southern Air Serv., Memphis, Tenn. | | Lyc. 50 | 300 hr. | New | 900 |
| Bennett Air Serv., P.O. Box 247, Hightstown, N.J. | J3 | Frnkln. 50 | 261 hr. | Just | 895 |
| Madison Flying Serv., R. 1, Madison, Ind. | J3 | Frnkln. 60 | 350 hr. | | 875 |
| White Fly. Serv., Inc., Caldwell Wright Arpt., Caldwell, N. J. | J3 | Lyc. 50 | 1201 hr. | 1/41 | 875 |
| Lexington Fly. Serv., Inc., Lexington Arpt., Lexington, Ky. | J-3 | Lyc. 55 | 1050 hr. | 1000 hr. | 875 |
| Southern Arwys. Sales Co., Munic. Arpt., Birmingham, Alabama | J-3 | Frnkln. 50 | 450 hr. | 425 hr. | 875 |
| Aircraft Associates, Inc., Mun Arpt., Long Beach, Calif. | J-3F-50 | Frnkln. 50 | 830 hr. | 80 hr. | 850 |
| Al Guthrie, Box 466, Stillwater, Okla. | Trainer | Cont. 50 | 1300 hr. | | 850 |
| Rudy Pekrul, Traverse City Arpt., Traverse City, Mich. | J-3-F | Frnkln. 50 | 1190 hr. | | 850 |
| West Coast Arcft., L.A. Munic. Arpt., Inglewood, Calif. | J3 | Frnkln. 50 | 590 hr. | 460 hr. | 850 |
| Krantz Aeron. Serv., Port Erie Arpt., Erie, Pa. | J3 | Frnkln. 50 | 950 hr. | No time since maj. | 850 |
| White Fly. Serv., Inc., Caldwell Wright Arpt., Caldwell, N. J. | J3 | Lyc. 50 | 1275 hr. | 8/40 | 850 |
| Alabama Air Serv., Auburn Arpt., Auburn, Ala. | J3L | Lyc. 55 | 900 hr. | 9/40 | 850 |
| Midwest Avia. Corp., Norton Fld., Col., O. | J3F | Frnkln. 50 | 1080 hr. | 2/41 | 850 |
| Akron Airw., Inc., Akron Arpt., Akron, Ohio. | J3L | Lyc. 50 | 910 hr. | Just | 850 |
| Dethloff Fly. Serv., Euclid Ave. Arpt., Willoughby, Ohio | J-3 | Frnkln. 50 | 800 hr. | Just maj. | 850 |
| Thomas Metcalf, Toledo Mun. Arpt., Toledo, O. | J-3 | Frnkln. 60 | 810 hr. | 620 hr. | 825 |
| Red Bank Arpt., Inc., Red Bank N. J. | J3 | Cont. 50 | 1085 hr. | 148 hr. | 825 |
| James S. Campbell, Rolla, Mo. | Trainer | Frnkln. 50 | 800 hr. | Just | 800 |
| James S. Campbell, Rolla, Mo. | Trainer | Frnkln. 50 | 950 hr. | Just | 800 |
| James S. Campbell, Rolla, Mo. | Trainer | Frnkln. 50 | 600 hr. | Just | 800 |


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## NATIONAL DISCOUNT CORPORATION

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# FLYING and POPULAR AVIATION USED PLANE LISTING OF

| DEALERS | MODEL AND ENGINE | | TIME | OVER-HAULED | PRICE |
|---|---|---|---|---|---|
| Rannells Air Service, Inc., Airport, Cumberland, Maryland | J3 | Frnkln. 60 | 800 hr. | 100 hr. | $800 |
| Aero Sales Corp., 1008 First Nat'l Bank Bldg., Birmingham, Ala | J-3-F | Frnkln. 60 | 525 hr. | 150 hr. | 800 |
| Page Airways, Arpt., Rochester, N. Y. | J3 | Lyc. 50 | 1215 hr. | 1086 hr. | 800 |
| Avia. Serv., Inc., Box 408, Newport News, Va. | J3L | Lyc. 50 | 825 hr. | 650 hr. | 800 |
| Virginia Cub Distributors Box 211, Farmville, Va | J3 | Frnkln. 50 | 800 hr. | 600 hr. | 800 |
| Johnson Flying Serv., Inc., Missoula, Mont | J-3 | Cont. 50 | 1400 hr. | 200 hr. | 795 |
| Fayette Arwys., Inc., Uniontown, Pa | J-3 | Lyc. 50 | 900 hr. | 12 '40 | 785 |
| Smith Fly. Serv., Wilkes-Barre Wyoming Valley Arpt., Forty-Fort, Pa | J-3 | Cont. 50 | 1230 hr. | 870 hr. | 775 |
| Alabama Air Serv., Auburn Arpt., Auburn, Ala. | J-3 | Frnkln. 50 | 725 hr. | 550 hr. | 775 |
| Jones Fly. Serv., Sullivant Ave. Airport, Columbus, Ohio | J-3 | Frnkln. 50 | 1500 hr. | No time since fac. | 775 |
| St. Louis Flying Service. Lambert Field, Robertson, Mo | J3F-50 | Frnkln. 4AC | 1060 hr. | 545 hr. | 750 |
| Southern Arwys., Munic. Arpt., Birmingham, Ala | J-3 | Lyc. 55 | 1000 hr. | 1000 hr. | 750 |
| Skelly's Fly. Serv., Greenville Arpt., Greenville, Pa | J-3 | Lyc. 50 | 1100 hr. | Maj. | 745 |
| Jenkins Air Serv., Mun. Arpt., Rochester, N. Y. | J3 Trainer | Lyc. 50 | 1080 hr. | 890 hr. | 725 |
| Hawthorne Flying Service, Municipal Airport, Charleston, S. C. | J3 | Frnkln. 50 | 1200 hr. | | 700 |
| Safair, Inc., Roosevelt Field, Mineola, N. Y. | J3 | Frnkln. 50 | 569 hr. | Just | 700 |
| Southern Airways, Munic. Arpt., Birmingham, Ala | J-3 | Frnkln. 50 | 1000 hr. | 1000 hr. | 700 |
| Avia. Sales, Box 408, Newport News, Va. | J3L | Lyc. 50 | 1100 hr. | 675 hr. | 700 |
| Midwest Avia. Corp., Norton Fld., Col., O. | J3F | Frnkln. 50 | 1068 hr. | 2 '41 | 700 |
| Wallace Aircraft Co., Clarcona, Fla | J2 | Cont. 40 | 700 hr. | May '41 | 695 |
| Johnny Haralson, Air. Trans. & Sales Co., Toney Field, Pine Bluff, Ark | J-3 | Cont. A-44 | 650 hr. | 600 hr. | 695 |
| Avia. Market, Los Angeles Metro. Arpt., Van Nuys, Calif | J-2 | Cont. 40 | 810 hr. | Yes | 675 |
| Oakland Arcft., Alameda, Calif | J-2 | Cont. 40 | 1785 hr. | May '40 | 665 |
| Edwards Flying Service, Inc., Flushing Airport, Flushing, L. I., N. Y | J3 | Cont. 40 | 1100 hr. | 75 hr. | 650 |
| F. W. Schrom, Box 164, Schrom Airport, Berwyn, Maryland | J-2 | Cont. A-40-5 | 240 hr. | Never | 650 |
| Edwards Flying Serv., Inc., Flushing Airport, Flushing, L. I., New York | J-3 | Cont. 40 | 1126 hr. | Recently | 650 |
| J. L. Schroeder, Inc., Houston Main St. Arpt., Houston, Texas | J-2 '36 Trainer | Cont. 40 | 647 hr. | Yes | 650 |
| Krantz Aeron. Serv., Port Erie Arpt., Erie, Pa. | J3 | Cont. 40 | 750 hr. | 30 hr. since | 650 |
| Piedmont Avia., Inc., Mun. Arpt., Winston-Salem, N. C | J-3 | Cont. 40 | 542 hr. | 63 hr. | 625 |
| Decatur Avia. Co., 776 S. Moffit St., Decatur, Illinois | J3C | Cont. 40 | 589 hr. | 25 hr. | 595 |
| Seidner Fly. Serv., S.A.M. Arpt., Youngstown, Ohio | J-2 | Cont. 40 | 396 hr. | 90 hr. | 579 |
| Piedmont Avia., Munic. Arpt., Winston-Salem, N. C | J-3 | Cont. 40 | 516 hr. | 201 hr. | 575 |
| Florida Aero and Supply Co., Cannon-Mills Field, Orlando, Florida | J-2 | Cont. A-40 | 575 hr. | None | 550 |
| Rannells Air Service, Inc., Airport, Cumberland, Maryland | J-2 | Cont. 40 | 500 hr. | 50 hr. | 500 |
| Lexington Fly. Serv., Mun. Arpt., Lexington, Ky. | J-2 | Cont. A-40-5 | 825 hr. | | 550 |
| Blvd. Arpt., Inc., Roosevelt Blvd., Phila., Pa. | J-2 | Cont. 40 | 650 hr. | 500 hr. | 550 |
| Phillips Fly. Serv., Arpt., Mt. Pleasant, Mich. | J-2 | Cont. 40 | 250 hr. | | 550 |
| Piedmont Avia., Inc., Munic. Arpt., Winston-Salem, N. C | J-2 | Cont. 40 | 574 hr. | 100 hr. | 525 |
| **PORTERFIELD** | | | | | |
| Al Guthrie, Stillwater Fly. Serv., Box 466, Stillwater, Okla | LP-65 | Lyc. 65 | 289 hr. | 276 hr. | 1500 |
| Otha Eddleman, P.O. Box 116, Crane, Tex. | CP-65 | Cont. 65 | 43 hr. | New | 1437 |
| Orangeburg Flying Service Inc., Box 250, Orangeburg, S. C | Turner | Cont. A50-L | 100 hr. | Never | 1250 |
| Aircraft Associates, Inc., Municipal Airport, Long Beach, Calif | LP65 | Lyc. 65 | 1416 hr. | Just | 850 |
| St. Louis Flying Service, Lambert Field, Robertson, Mo | 35-70 | LeBlond 70 | 406 hr. | 4 hr. | 750 |
| Colorado Avia. Co., 426 U.S. Nat'l., Denver, Colo | | Cont. 40 | None since | Complete major | 675 |
| Orangeburg Flying Service, Inc., Box 250, Orangeburg, S. C | 35-70 | LeBlond | 375 hr. | 40 hr. | 600 |
| **REARWIN** | | | | | |
| Aircraft Sales of Michigan, City Airport, Detroit, Michigan | Cloudster | Ken-Royce 120 | New | Never | 5500 |
| Aero Sales Corp., 1008 Nat'l Bldg., Birmingham, Ala | Cloudster | Ken-Royce120 | 120 hr. | | 4500 |
| C. W. Peterson, Mun. Arpt., Salina, Kansas | Cloudster | Ken-Royce 120 h.p. | 300 hr. | Topped 270 hr. | 3200 |
| Al Gillis Flying Service P. O. Box 1806 Great Falls, Mont | Cloudster | Ken-Royce 120 | 225 hr. | Just | 2950 |
| Aircraft Sales of Michigan, Detroit City Arpt. Detroit, Mich | Skyranger 180 | Frnkln. 80 | 19 hr. | | 2695 |
| Aero Sales Corp., First National Building, Birmingham, Ala | Skyranger | Frnkln. 80 | New | | 2545 |
| Aero Sales Corp. First National Building, Birmingham, Ala | Skyranger | Frnkln. 80 | 30 hr. | | 2350 |
| C. Evers, 247 Park Ave., N. Y. C | | Warner 90 | 138 hr. | None | $2250 |
| Aero Sales Corp., 1008 First National Building, Birmingham, Ala | Skyranger | Frnkln. 80 | 27 hr. | | 2200 |
| Paris Fly. Serv., Mun. Arpt., Paris, Texas | Skyranger | 175 Cont. 75 | 125 hr. | | 2100 |
| M. H. Wall, P.O. Box 327, Willoughby, O. | Skyranger | 175 Cont. 75 | 35 hr. | | 1935 |
| Dewey Eldred Fly. Serv., Inc., Willoughby, O. | Skyranger | Cont. 75 | 40 hr. | | 1845 |
| Dawson Air. Serv., Box 852, Salina, Kansas | 9000 L | LeBlond 90 | Engine 276 hr. | 41 hr. | 1200 |
| Jennings Bros., No. Grafton, Mass | | LeBland 70 | 680 hr. | 50 hr. | 1075 |
| E. W. Wiggins Airways, Inc., Boston, Met. Arpt., Norwood, Mass | 8500 | LeBlond 85 | 802 hr. | 111 hr. | 975 |
| Southern Arwys. of Danville, Box 205, Danville, Va | 1936 | LeBlond 85 | 368 hr. | Never | 975 |
| Racine Fly. Serv., Racine Arpt., Racine, Wis. | 7000 | LeBlond 70 | 536 hr. | 510 hr. | 850 |
| St. Louis Flying Service, Lambert Field, Robertson, Mo | 7000 | LeBland5DE | 555 hr. | 65 hr. | 650 |
| **RYAN** | | | | | |
| Standard Fly. Serv., Inc., Somerset Hills Arpt., Basking Ridge, N. J. | STA | Menasco 125 | 190 hr. | 150 hr. | 3450 |
| Schnieder Aero. Serv, Chandler Fld., Fresno, Calif | Photographic | Wright J-6-9 B-5 10-15-1 Blower | 1625 hr. | 120 hr. | 1350 |
| **SIKORSKY** | | | | | |
| Aviation Market, L.A. Met. Arpt., Van Nuys, Calif | S-39 | Wasp 450 | 540 hr. | 40 hr. | 6850 |
| E. W. Wiggins Arwys., Inc., Providence, R. I. | | Wasp 450 | 600 hr. | Recently | 5500 |
| **SPARTAN** | | | | | |
| Spartan Sch. of Aero., Box 2551, Tulsa, Okla. | C-3 | Wright J6-7 225 h.p. | 900 hr. | Just | 700 |
| Spartan Sch. of Aero., Box 2551, Tulsa, Okla. | C-3-165 | Wright J6-5 | 95 since | no time since | 500 |
| **STANDARD** | | | | | |
| Becker Arcft. Sales, Bettis Arpt. Homestead, Pa | D-25 | J-5-225 | 500 hr. | 150 hr. | 1500 |
| A. A. Knowles, Rt. 4, Boise, Ida | New | Wright J 5 220 | 417 hr. Motor | 3 '40 Motor | 1000 |
| Bob Wight, Box 487, Biloxi, Miss | D-25 | J-5-220 | 1275 hr. | 670 hr. | 850 |
| **STEARMAN** | | | | | |
| St. Louis Flying Service, Lambert Field, Robertson, Mo | C3R | Wright J6-760 | 1493 hr. | 68 hr. | 1750 |
| Stinson Fly. Corp., San Francisco, Mun. Arpt., S. San Francisco, Calif | Hammond | Menasco 150 | 500 hr. | 10 '40 | 1500 |
| Mamer-Shreck Air Transport, Felts Field, Spokane, Washington | | Wright J-5 | 847 hr. | 107 hr. | 1250 |
| Tacoma Fly. Serv., Box 157, Sc. Tacoma, Wash | C-3-B | Wright J-5 220 | 1800 hr. | Recently | 800 |
| **STINSON** | | | | | |
| F. W. Schrom, Schrom Airport Berwyn, Md | | Wright 350 Reliant SR-SD | 240 hr. | Just | 9000 |
| Hyannis Arpt. Corp., Box 592, Hyannis, Mass. | Reliant | Lyc. 245 | 388 hr. | 2 '41 | 6000 |
| Thomas Oakes, 240 Belleville Ave., Bloomfield, N. J. | SR9BD | Lyc. 245 | 620 hr. | 350 hr. | 4500 |
| Susquehanna Air Service, Williamsport Airport, Montourville, Pa | SR-5 | Lyc. 245 | 920 hr. | 120 hr. | 4250 |
| Indiana Air Serv., Inc., Bendix Fld., So. Bend, Indiana | SR-7C | Lyc. 260 | 1600 hr. | 3 '41 | 3500 |
| Oak Air Serv., Inc., Bates Fld., Mobile, Ala. | Spec. 105 | Cont. 80 | 200 hr. | | 3250 |
| Air. Serv., Inc., Bellanca Fld., New Castle, Del. | 105 | Cont. 80 | 101 hr. | 2 hr. | 2950 |
| Oak Air Serv., Inc., Bates Field, Mobile, Ala. | 105 Deluxe | Cont. 80 | 200 hr. | | 2950 |
| Inter City Aviation, Inc., Boston Munic. Arpt., East Boston, Mass | 105 | Cont. 80 | 92 hr. | | 2875 |
| Cincinnati Arcft. Serv., Lunken Arpt., Cincinnati, Ohio | 105 | Cont. 80 | 201 hr. | Never | 2850 |
| Aviation Market, L.A. Met. Arpt., Van Nuys, Calif | 105 | Cont. 80 | 145 hr. | New | 2750 |
| Paul E. DePover, Marshall, Minn | 105 | Cont. 80 | 80 hr. | | 2600 |
| Jenkins Air Serv., Inc., Mun. Arpt., Rochester, N. Y | 105 | Cont. 80 | 215 hr. | | 2550 |
| Mamer-Shreck Air Transport, Felts Field, Spokane, Washington | 105 | Cont. 75 | 236 hr. | 236 hr. | 2500 |
| Edwards Flying Serv., Inc., Flushing Arpt., Flushing, L. I., New York | 105 | Cont. 80 | 625 hr. | Just | 2500 |
| Pete Grim, R.F.D. 4, Staunton, Va | 105 | Cont. 80 | 211 hr. | None | 2500 |
| Moline Fly. Serv., Mun. Arpt., Moline, Illinois. | SR-5A | Lyc. 245 | 850 hr. | 760 hr. | 2495 |
| Narragansett Avia. Serv., R.I. State Arpt., Hillsgrove, R. I. | 105 '40 | Cont. 80 Starter | 454 hr. | Just Majored | 2495 |
| John Ruzicks, Circus City Arpt., Peru, Ind. | Reliant | Lyc. 215 | 460 hr. | 60 hr. | 2400 |
| Doug Schall, Inc., 33 Clagett Rd., Hyattsville, Md | 105 | Cont. 180 | 200 hr. | Eng.50hr. | 2450 |
| Leech Aircraft, Inc., Hangar F, Roosevelt Field, Mineola, New York | 1939 | Cont. 80 | 600 hr. | 246 hr. | 2350 |
| Detroit School of Aviation, Inc., Joy Airport, Fraser, Michigan | 105 | Cont. 80 | 140 hr. | Never | 2150 |

# AUTHORIZED AIRCRAFT DEALERS

| DEALERS | MODEL AND ENGINE | | TIME | OVER-HAULED | PRICE |
|---|---|---|---|---|---|
| Colo. Avia. Co., 426 U.S. Nat'l B.B., Denver, Colo. | 105 | Cont. 175 | 400 hr. | Yes | $2150 |
| Upton & Bowen, West Memphis, Ark. | 105 | Cont. 75 | 275 hr. | 5 hr. | 2000 |
| Colorado Aviation Company, 426 U.S. Nat'l Bank Bldg., Denver, Colo. | | Cont. 75 | 400 hr. | Just | 1900 |
| Narragansett Avia. Serv., R.I. State Arpt., Hillsgrove, R. I. | SR 5 | Lyc. 225 | 1350 hr. | 10 hr. | 1900 |
| Colorado Aviation Company, 426 U.S. Nat'l Bank Building, Denver, Colo. | 105 | Cont. 75 | 380 hr. | Recently | 1900 |
| Orangeburg Flying Service, Inc., Box 250, Orangeburg, S. C. | SM-8A | Lyc. 210 | 925 hr. | 200 hr. | 1350 |
| Becker Aircraft Sales, Bettis Arpt., Homestead, Pa. | SM | Lyc. 225 | 600 hr. | 50 hr. | 1350 |
| Akron Airways, Arpt., Akron, Ohio. | SR | Lyc. | 850 hr. | 350 hr. | 1350 |
| Doug Schall, Inc., 33 Clagett Rd., Hyattsville, Md. | Stinson '33 | Lyc. 215 | 900 hr. | | 1300 |
| R. E. B. Springer, Box 567, Waynesburg, Pa. | SM-8A | Lyc. 215 | 1200 hr. | 50 hr. | 1200 |
| Foster A. Lane, Fort Columbus, Columbus, Ohio | R | Lyc. 215 | 937 hr. | Just | 1100 |
| Springfield Avia. Co., Munic. Arpt., Springfield, Illinois. | SM-8A | Lyc. 215 | 750 hr. | 360 hr. | 1050 |
| Livingston Airways Corp., Chapman Fld., Waterloo, Iowa. | SM-8A | Lyc. 215 | 930 hr. | 900 hr. | 1000 |
| DuBois Avia. Assoc., Munic. Arpt., DuBois, Pa. | S | Lyc. 215 | 1053 hr. | 347 hr. | 950 |
| Louis A. Musgrove, Munic. Arpt., Elkins, W. Va. | S | Lyc. 215 | 1000 hr. | 400 hr. | 900 |
| Decatur Avia. Co., 776 S. Maffit St., Decatur, Illinois. | SM-1F | Wright J69 330 h.p. | 850 hr. | 220 hr. | 895 |
| Maheux's Airport, Inc., Stevens Mill Road, Auburn, Maine. | SM-8A | Lyc. 215 | 970 hr. | 226 hr. | 875 |
| Flying Dutchman Air. Serv., Sometown Arpt., Phila., Pa. | SM-8A | Lyc. 220 | 1474 hr. | 30 hr. | 875 |
| E. H. Brockenbrough, Munic. Arpt., Charlotte, N. C. | SM-8A | Lyc. 215 | 850 hr. | 820 hr. | 800 |
| California Arcft. Corp., Box 170, Van Nuys, Calif. | SM-1 | Wright J-5 220 | 1900 hr. | 100 hr. | 750 |
| Becker Arcft. Sales, Bettis Arpt., Homestead, Pa. | SM-8A | Lyc. 215 | 700 hr. | | 700 |
| Leeward Avia., New Kensington, Pa. | SM-2 | Warner 125 | 550 hr. | Yes | 500 |
| **TAYLORCRAFT** | | | | | |
| G. A. Short, Walnut, Illinois. | DeLuxe BC12 | Cont. 65 | 45 hr. | Never | 2050 |
| Moberly Flying Service, 605 Cancannon St., Moberly Mo. | B-12 '41 DeL. | Lyc. 65 | 30 hr. | New | 1975 |
| Inter-City Flying Service, Munic. Arpt., Ft. Wayne, Indiana. | DeLuxe | Cont. 65 | 176 hr. | New 5/22/41 | 1925 |
| Inter-City Flying Service, Municipal Airport, Ft. Wayne, Ind. | 1941 Deluxe | Cont. 65 | 40 hr. | Never | 1900 |
| Inter-City Flying Service, Municipal Airport, Ft. Wayne, Ind. | 1941 Deluxe | Cont. 65 | 100 hr. | Never | 1850 |
| Avia. Mkt., L.A. Metro. Arpt., Van Nuys, Calif. | BL-65 | Lyc. 65 | 38 hr. | New | 1875 |
| Tuscarawas County Aviation, Inc., Munic. Airport, New Philadelphia, Ohio. | BL12 | Lyc. 65 | 81 hr. | Never | 1825 |
| Hubert & Dillon Air Serv., Box 177-S, Tacoma, Wash. | BL Del. | Lyc. 65 dual | 200 hr. | | 1825 |
| Inter-City Flying Service, Municipal Airport, Ft. Wayne, Ind. | 1941 J5 Cruiser | Cont. 75 | 75 hr. | Never | 1800 |
| Inter-City Flying Service, Municipal Airport, Ft. Wayne, Ind. | 1941 DeLuxe | Cont. 65 | 290 hr. | Never | 1800 |
| West Coast Arcft., L. A. Munic. Arpt., Inglewood, Calif. | Silvercraft | Lyc. 65 | 53 hr. | New | 1795 |
| Aviation Market, L.A. Metro. Arpt., Van Nuys, Calif. | BL65 | Lyc. 65 | 35 hr. | New | 1750 |
| Walter D. Mauk, Box 556, Blackwell, Okla. | '40 DeLuxe | Cont. 65 | 21 hr. | New | 1750 |
| Wichita Falls Air Transp. Co., Box 84, Munic. Arpt., Wichita Falls, Tex. | BL-65 | Lyc. 65 | New | New | 1750 |
| Springfield Avia. Co., Munic. Arpt., Springfield, Ill. | BC-65 | Cont. 65 | 195 hr. | None | 1750 |
| Dufort Sch. of Aeronautics, 57 Ft. Covington St., Malone, N. Y. | | Cont. 65 | 390 hr. | New May '40 | 1725 |
| Washington Pk. Arpt., Homewood, Ill. | | Cont. 65 | 150 hr. | None | 1650 |
| Palmyra Arpt., 817 Lincoln Ave., Palmyra N. J. | BL | Lyc. 65 h.p. | 138 hr. | Never | 1625 |
| Dufort School of Aero, Massena Airport, Massena, New York. | BL | Lyc. 65 | 380 hr. | Maiored 10 hr. back | 1600 |
| Moline Fly. Serv., Munic. Arpt., Moline, Ill. | Deluxe BC | Cont. 65 | 950 hr. | Mai.now | 1600 |
| Tuscarawas County Aviation, Inc., Municipal Airport, New Philadelphia, Ohio. | BL-12 | Lyc. 65 | 248 hr. | Never | 1595 |
| West Coast Arcft., L. A. Munic. Arpt., Inglewood, Calif. | BC-65 | Cont. 65 | 465 hr. | No | 1595 |
| Aircraft Unlimited, Roosevelt Field, Mineola, New York. | | Lyc.65 Dual | 400 hr. | No | 1550 |
| F. F. Swinson, 101-107 S. Main St., Pratt, Kansas. | '40 Deluxe | Lyc. 65 | 300 hr. | | 1550 |
| Hubert & Dillon Air Serv., Box 177S, Tacoma, Wash. | BC | Cont. 65 | 450 hr. | Motor topped | 1525 |
| Roch. Aeron. Corp., Roch. Arpt., Roch., N. Y. | BL-65 | Lyc. 65 | 80 hr. | | 1525 |
| Clinch Flying Service, Municipal Airport, North Platte, Nebraska. | BL | Lyc. 65 | 1540 hr. | | 1500 |
| Narragansett Avia. Serv., R.I. State Arpt., Hillsgrove, R. I. | BL-40 | Dual Ign. Lyc. 65 | 254 hr. | Will be | 1495 |
| Niederhauser Airways, 111½ West Church St., Marshalltown, Iowa. | BL | Lyc. 65 | 400 hr. | 400 hr. | 1475 |
| St. Louis Flying Service, Lambert Field, Robertson, Mo. | BL-65 | Lyc. 65 | 180 hr. | Recently | $1475 |
| McInnis Avia. Serv., Wold Chamberlain Arpt., Minneapolis, Minn. | BL-65 | Lyc. 65 | 68 hr. | New | 1475 |
| Louis A. Musgrove, Munic. Arpt., Elkins, W. Va. | BL-T | Lyc. 65 | 350 hr. | 350 hr. | 1450 |
| Ranger Fly. Serv., Ranger, Texas. | BL-65 | Lyc. 65 | 140 hr. | 140 hr. | 1450 |
| Rochester Aeronautical Corp., Rochester Arpt., Rochester, N. Y. | BL-65 | Lyc. 65 | 470 hr. | | 1450 |
| Inter-City Fly. Serv., Munic. Arpt., Ft. Wayne, Ind. | BC DeLuxe | Cont. 65 | 800 hr. | 757 hr. | 1445 |
| Niederhauser Airways, 111½ West Church St., Marshalltown, Iowa. | BL | Lyc. 65 | 700 hr. | 600 hr. | 1400 |
| Moline Fly. Serv., Munic. Arpt., Moline, Ill. | DeLuxe BL | Lyc. 65 | 675 hr. | None | 1400 |
| Palmyra Arpt., 817 Lincoln Ave., Palmyra, N. J. | BL | Lyc. 65 | 318 hr. | Never | 1400 |
| Ranger Fly. Serv., Munic.Arpt., Ranger, Texas | BL-65 | Lyc. 65 dual | 170 hr. | 170 hr. | 1395 |
| Washington Pk. Arpt., Inc., Homewood, Ill. | | Lyc. 50 | 85 hr. | None | 1390 |
| Tuscarawas County Aviation, Inc., Municipal Airport, New Philadelphia, Ohio. | BL | Lyc. 65 | 504 hr. | Never | 1375 |
| Peoria Aero Sales Co., 342 Knoxville, Peoria, Illinois. | BC-65 | Lyc. 65 | 120 hr. | | 1350 |
| Inter-City Flying Service, Municipal Airport, Ft. Wayne, Ind. | '40 Craft BC65 Deluxe | Cont. 65 | 900 hr. | 796 hr. | 1350 |
| Dawson Air Serv., Box 852, Salina, Kans. | DeLuxe BL | Lyc. 65 | 840 hr. | Just | 1350 |
| Dufort Sch. Aerona. 57 Ft. Covington St., Malone, N. Y. | BT | Lyc. 55 | 225 hr. | New Oct. '40 | 1350 |
| Ranger Fly. Serv., Ranger, Texas. | BL-55 | Lyc. 55 | 180 hr. | 180 hr. | 1350 |
| Inter-City Fly. Munic. Arpt., Ft. Wayne, Ind. | BL '40 | Lyc. 50 | 326 hr. | | 1325 |
| Greenville Sch. Avia., Treaty City Arpt., Greenville, Ohio. | BL | Lyc. 65 | 265 hr. | None | 1300 |
| Hopewell Fly. Serv., Hopewell Arpt., Hopewell, Va. | BL-65 | Lyc. 65 | 375 hr. | 9/40 | 1300 |
| Inter-City Flying Service, Municipal Airport, Fort Wayne, Ind. | Deluxe '40 | Cont. 65 | 1200 hr. | 250 hr. | 1275 |
| Peoria Aero Sales Co., 342 Knoxville, Peoria, Illinois. | BC-65 | Lyc. 65 | 180 hr. | | 1250 |
| Dufort School of Aeronautics, Massena Airport, Massena, New York. | BL | Lyc. 55 | 506 hr. | Never | 1220 |
| Piedmont Aviation, Inc., Municipal Airport, Winston-Salem, N. C. | Trainer '40 | Lyc. 65 Dual | 77 hr. | None | 1200 |
| Dethloff Flying Service, Euclid Avenue Airport, Willoughby, Ohio. | | Lyc. 55 | 200 hr. | No | 1200 |
| Earl J. Howard, P.O. Box 565, Ames, Iowa. | BLT | Lyc. 65 | 510 hr. | None | 1200 |
| Marlboro Arpt., Inc., Farm Road, Marlboro, Mass. | BL-65 | Lyc. 65 | 372 hr. | None | 1200 |
| Rochester Aeron. Corp., Rochester Arpt., Rochester, N. Y. | BL-55 | Lyc. 55 | 500 hr. | None | 1200 |
| Tuscarawas County Aviation, Inc., Municipal Airport, New Philadelphia, Ohio. | BL | Lyc. 65 | 880 hr. | Never | 1195 |
| Boyd Mote, Denman Ave., Coshocton, Ohio. | BL-50 | Lyc. 50 | 105 hr. | New 1940 | 1195 |
| Inter-City Aviation, Inc., Boston Airport, East Boston, Mass. | '39 | Lyc. 55 | 550 hr. | Just | 1175 |
| Dufort School of Aeronautics, Massena Airport, Massena, New York. | BL | Lyc. 55 | 395 hr. | | 1150 |
| Four Lakes Aviation Corp., Royal Airport, Madison, Wisc. | B '39 DeLuxe | Lyc. 65 | 525 hr. | 360 hr. | 1150 |
| Fowler Flying Service, Airport, Dodge City, Kansas. | BLT | Lyc. 55 | 750 hr. | 550 hr. | 1150 |
| Dufort Sch. Aero., 57 Ft. Covington St., Malone, N. Y. | BT | Lyc. 55 h.p. | 395 hr. | New 5/40 | 1175 |
| Tuscarawas County Aviation, Inc., Municipal Airport, New Philadelphia, Ohio. | BL | Lyc. 65 | 975 hr. | Never | 1145 |
| Harry C. Phillips, Phillips Flying Service, Mt. Pleasant, Mich. | BLT | Lyc. 50 | 500 hr. | Never | 1100 |
| Zimmerly Brothers Air Transport, Box 266, Lewiston, Ida. | BL | Lyc. 50 | 955 hr. | 10 hr. | 1100 |
| Palmyra Arpt., 817 Lincoln Ave., Palmyra, N. J. | BLT | Lyc. 50 h.p. | 373 hr. | 83 hr. Since Maj. | 1100 |
| Dewey Eldred Fly. Serv., Lost Nation Arpt., Willoughby, Ohio. | BL-65 | Lyc. 65 | Ship 831 hr. | 11/40 | 1100 |
| Phillips Flying Service, Arpt., Mt. Pleasant, Mich. | BL-50 | Lyc. 50 | 800 hr. | 650 hr. | 1100 |
| Hood Air-Craft Sales Co., Box No. 171, Northampton, Mass. | DeLuxe | Lyc. 50 | 800 hr. | 180 hr. | 1050 |
| Duane L. Huscher, Box 65, Lawton, Okla. | BF | Frnkln. 50 | 1302 hr. | 197 hr. | 1050 |
| Decatur Avia. Co., 776 S. Maffit St., Decatur, Illinois. | BL | Lyc. 50 | 570 hr. | No | 1050 |
| Ryan Air Serv., Decorah, Iowa. | Late '39 | Lyc. 50 | 770 hr. | 350 hr. Since | 1050 |
| Wichita Falls Air Transp. Co., Box 84, Munic. Arpt., Wichita Falls, Texas. | BLT-55 | Lyc. 55 | 400 hr. | 50 hr. | 1050 |
| Phillips Fly. Serv., Arpt., Mt. Pleasant, Mich. | BL-50 | Lyc. 50 | 1100 hr. | 900 hr. | 1050 |
| Merrill Hale, Hillsgrove, R. I. | | Frnkln. 50 | 268 hr. | 35 hr. | 1050 |
| Hood Aircraft Sales Co., Box No. 171, Northampton, Mass. | DeLuxe | Lyc. 55 | | Recently | 1000 |
| Albert E. Phillips, 106 South Main, Tulsa, Okla. | BL | Frnkln. 50 Dual | 424 hr. | | 1000 |
| Indiana Air Serv., Bendix Fld., South Bend, Ind. | BL | Lyc. 55 | 1038 hr. | | 1000 |
| Louis A. Musgrove, Box 814, Morgantown, W. Va. | BL | Lyc. 50 | 725 hr. | 150 hr. | 1000 |
| Spartan School of Aeron., Box 2551, Tulsa, Okla. | BL-50 | Lyc. 50 | 1400 hr. | 160 hr. | 1000 |
| Rochester Aeron. Corp., Rochester Arpt., Rochester, N. Y. | BL-65 | Lyc. 65 | 1102 hr. | 140 hr. | 1000 |

# FLYING and POPULAR AVIATION USED PLANE LISTING OF AUTHORIZED AIRCRAFT DEALERS

| DEALERS | MODEL AND ENGINE | | TIME | OVER-HAULED | PRICE |
|---|---|---|---|---|---|
| Dewey Eldred Fly. Serv., Inc., Willoughby, O | | Lyc. 55 | 1036 hr. | Just 130 hr. | $995 |
| Narragansett Avia. Serv., R. I. State Arpt., Hillsgrove, R. I. | BF | Frnkln. 50 | 351 hr. | Since | 995 |
| Fowler Fly. Serv., Arpt., Dodge City, Kans. | BL | Lyc. 55 | 1100 hr. | 25 hr. | 950 |
| Louis A. Musgrove, Munic. Arpt., Elkins, W. Va. | BL-T | Lyc. 55 | 1100 hr. | 25 hr. | 950 |
| Schneider Aero. Serv., Chandler Fld., Fresno, Calif. | BC | Cont. 50 | 1216 hr. | 106 hr. | 950 |
| Harry C. Phillips, Phillips Flying Service, Mt. Pleasant, Mich. | BL-T | Lyc. 50 | 1100 hr. | 400 hr. | 925 |
| A. B. Eugle 518 Lake Avenue Lake Worth, Fla. | 50L | Cont. 40 | 380 hr. | Rebuilt May '41 | 900 |
| Hobley-Maynard Air Serv., New Orleans Airport, New Orleans, La. | BL | Lyc. 50 | 1600 hr. | No time since | 900 |
| Indiana Air Serv., Bendix Fld., South Bend, Ind. | BL | Lyc. 50 | 970 hr. | | 900 |
| Foster A. Lane, Lane Avia. Corp., Cleveland Arpt., Cleveland, Ohio | | Lyc. 50 | 950 hr. | 50 hr. | 875 |
| Moberly Fly. Serv., 605 Concannon St., Moberly, Mo. | '39 | Frnkln. 50 | 720 hr. | Topped 60 hr. ago | 875 |
| Harry C. Phillips, Phillips Flying Service, Mt. Pleasant, Mich. | BL-T | Lyc. 50 | 1500 hr. | 500 hr. | 850 |
| Schneider Aero Service, Chandler Field, Fresno, Calif. | B-C | Cont. 50 | 1377 hr. | 106 hr. | 850 |
| Piedmont Avia., Munic. Arpt., Winston-Salem, N. C. | '39 | Frnkln. 50 | 563 hr. | 164 hr. | 825 |
| Foster A. Lane, Port Columbus, Columbus, O. | BL | Lyc. 50 | 1700 hr. | 497 hr. | 800 |
| Leon D. Sherrick, McKinley Airport, Canton, O. | '39 DeLuxe | Lyc. 50 | 1175 hr. | 300 hr. | 795 |
| Dufort School of Aeronautics, Massena Airport, Massena, N Y. | BF | Frnkln. 50 | 785 hr. | Just | 795 |
| Jennings Bros., No. Grafton, Mass. | | Cont. 40 | 660 hr. | 100 hr. | 800 |
| Canton Avia. Co., Martin Fld., Canton, O. | BL-T | Lyc. 50 | 780 hr. | Engine Maj. | 795 |
| Atlantic Aviation Service, Duport Airport, Wilmington, Del. | | Frnkln. 50 | 1000 hr. | Low | 775 |
| Kenneth Benesh, Monticello, Ia. | A | Cont. 40 | 180 hr. | None | 745 |
| Lowell White, Fairview, Ill. | | Cont. A40 | 500 hr. | 400 hr. | 725 |
| Duane L. Huscher, Box 65, Lawton, Okla. | A | Cont. A40-4 | 600 hr. | 75 hr. | 725 |
| Rome Boekenhoff, Jr., 2038 Spring St., Quincy, Ill. | A | Cont. 40 | 576 hr. | 2/41 | 700 |
| Carnahan Fly. Serv., Bloomington, Ill. | | Cont. 40 | 507 hr. | Since 100 hr. | 700 |
| Merrill Hale, Hillsgrove, R. I. | | Cont. 40 | 1081 hr. | 100 hr. | 695 |
| Lynchburg Air Trans. and Sales Corp., Preston Glenn Airport, Lynchburg, Va. | '38 | Cont 40 | 372 hr. | Never | 675 |
| Virginia Cub Distributors, Box 211, Farmville, Va. | | Cont. 40 | 500 hr. | Just | 670 |
| Roy D. Hume, Box 551, Arkansas City, Kans. | A | Cont. A-40 | 1015 hr. | No time | 655 |
| Lynchburg Air Transport and Sales Corp., Preston Glenn Airport, Lynchburg, Va. | '38 | Cont. 40 | 395 hr. | | 650 |
| Springfield Avia. Co., Munic. Arpt., Sprgfld., Ill. | | Cont.A-40-4 | 375 hr. | None | *650 |
| J. L. Wells, 106 W. Main, Avon Park, Fla. | | Cont. 40 | 690 hr. | 100 hr. | 650 |
| Southern Airways, Municipal Airport, Birmingham Ala. | | Cont. 40 | 400 hr. | 400 hr. | 600 |
| R. H. Brockenbrough, Munic. Arpt. Charlotte, N. C. | A | Cont. 40 | 550 hr. | 520 hr. | 600 |
| Southern Airways, Munic. Arpt., Birmingham, Ala. | A | Cont 40 | 375 hr. | 350 hr. | 550 |
| **TRAVELAIR** | | | | | |
| Speer Flying Service, 3330 Barnett, San-Diego, Calif. | 16E | Wright 125 | 1235 hr. | 75 hr. | 2950 |
| Falcon Arcft. Corp. L.A Munic Arpt. Inglewood, Calif. | Osprey | Wright 250 | 814 hr. | Major 80 hr. | 2500 |
| Art Whitaker, Box 3820, Portland, Oregon. | | Wright J6-7 | 1100 hr. | 100 hr. | 1850 |
| Dufort School of Aeronautics, Massena Airport, Massena New York | BL | Lyc. 65 | 225 hr. | | 1295 |
| Northeast Airways, Inc., Portland City Arpt., Portland, Maine | Trainer '40 | Lyc. 55 | 591 hr. | 91 hr. | 1250 |
| Indiana Air Serv., Inc., Bendix Fld., So Bend, Ind. | 4000 | Wright J-5, 220 | 940 hr. | 7/40 | 1200 |
| Aviation Service Company, Inc., Box 32, Hartford, Conn. | BL | Lyc. 55 | 324 hr. | No | 1200 |
| Clinch Flying Service, Municipal Airport, North Platte Nebr. | BL | Lyc. 50 | 931 hr. | 908 hr., | 1200 |
| Louis A. Musgrove, Airport, Elkins, W. Va. | BL-T | Lyc. 65 | 600 hr. | 200 hr. | 1200 |
| H. E. Oliver, 63 Orchard St., Pittsfield, Mass. | BL | Lyc. 55 | 450 hr. | Top 400 hr. | 1200 |
| McInnis Avia. Serv., Wold Chamberlain Arpt., Minneapolis, Minn. | 4000 | Wright J-5, 220 | 1590 hr. | 110 hr. | 1175 |
| Kenneth Benesh, Monticello, Ia. | 4000 | Wright J-5, 225 | 1200 hr. | 30 hr. | 1100 |
| Cedar Rapids Arwys., Inc., Cedar Rapids, Ia. | 4000 | Wright J65 | 12 hr. | Since | 1050 |
| Shaw Aircraft Company, Municipal Airport, Iowa City Iowa | 4000 | J-5 | 1400 hr. | 400 hr. | 1000 |
| C. W. Peterson, Munic. Arpt., Salina, Kans. | C-4000 | Chall. 185 | 600 hr. | Topped 12 hr. | 1000 |
| St. Louis Flying Service, Lambert Field, Robertson, Mo. | Sport | Wright Gypsy | 579 hr. | 154 hr. | 850 |
| Foster A. Lane, Port Columbus, Columbus, O. | 4000 | Kinner K5 100 | 545 hr. | 210 hr. | 750 |
| Leeward Avia. New Kensington, Pa. | | Chall 185 | 700 hr. | Yes | 745 |

| DEALERS | MODEL AND ENGINE | | TIME | OVER-HAULED | PRICE |
|---|---|---|---|---|---|
| Leeward Aviation, New Kensington, Pa. | 4000 | Chall. 185 | 600 hr. | 48 hr. | $725 |
| Decatur Avia. Co., 776 S. Maffit St., Decatur, Illinois | 2000 | Tank 115 | 855 hr. | 150 hr. | 675 |
| Virgil S. King, Warren Arpt. Warren, Pa. | 2000 | Tank 115 | 446 hr. | 1941 hr. | 525 |
| **VERVILLE** | | | | | |
| Oak Air Service Inc., Bates Field, Mobile, Ala. | AT-31 | Cont. 165 | 349 hr. | 1/41 | 900 |
| **WACO** | | | | | |
| Buroker-Hicks Flying Service, Olympia Airport, Olympia, Washington | UpF | Cont. 220 | 712 hr. | | 6600 |
| J. Wade Stewart, 1319 Avery St., Parkersburg, W. Va. | N | Jacobs 330 | 100 hr. | | 5500 |
| Palo Alto Airport, Inc., Box 640, Palo Alto, Calif. | UPF-7 | 220 | 715 hr. | 307 hr. | 5000 |
| Livingston Airways Corp., Chapman Field, Waterloo, Iowa | S '37 | Jacobs 225 | 185 hr. | | 4200 |
| Thompson Flying Service, Salt Lake Airport, Salt Lake City, Utah. | UPF-7 | Cont. 220 | 1850 hr. | 20 hr. | 4000 |
| Mountain Aviation, Inc., 3800 Oahlia Street, Denver, Colo. | Standard | Jacobs 225 | 255 hr. | No | 4000 |
| Aviation Market L.A. Metropolitan Airport, Van Nuys, Calif. | SO-8 | Jacobs 225 | 173 hr. | New Eng. | 3650 |
| Doug Schall, Inc., 33 Clagett Rd., Hyattsville, Md. | Custom Cab '36 | Wright 285 | 800 hr. | 50 hr. | 3400 |
| Air Serv., Inc., Munic. Arpt., Denver, Colo. | Cust. Cabin | Jacobs 225 | 990 hr. Ship | 2/41 | 3400 |
| Northern Okla. Fly. Serv., P.O. Box 556, Blackwell, Okla. | YKS-6 | Jacobs 225 | 408 hr. | 16 hr. | 3250 |
| Walter D. Mauk, Box 556, Blackwell, Okla. | YKS-6 | Jacobs 225 | 435 hr. | 416 hr. | 3000 |
| Safair, Inc., Roosevelt Field, Mineola, N. Y. | YMF | Jacobs 225 | 1191 hr. | 54 hr. | 2990 |
| Safair, Inc., Roosevelt Field, Mineola, N. Y. | YMF | Jacobs 225 | 1236 hr. | Just | 2990 |
| E. W. Wiggins Airways, Inc., Boston Met. Arpt., Norwood, Mass. | C | Wright 285 | 413 hr. | 5 hr. | 2500 |
| E. W. Wiggins Arwys., Inc., Providence, R.I. | C | Wright 285 | 350 hr. | Recently | 2500 |
| Aviation Service Co., Inc., Box 32 Hartford, Conn. | YOC | Jacobs L4 225 | 720 hr. | 510 hr. | 2300 |
| Avia. Serv. Co., Inc., P.O. Box 32, Hartford, Conn. | YOC | Jacobs 225 | 720 hr. | 220 hr. | 2250 |
| Roy R. Taylor, Meacham Field, Fort Worth, Texas. | RNF | Warner 125 | 1710 hr. | Just | 2250 |
| Spartan School of Aeronautics Box 2551, Tulsa, Okla. | ZKS-6 | Jacobs L-5 285 h.p. | 1193 hr. | Just | 2200 |
| Spartan School of Aeronautics, Box 2551, Tulsa, Okla. | ZKS-6 | Jacobs L-5 285 h.p. | 1193 hr. | 183 hr. | 2200 |
| Inter-City Avia., Inc., Boston Munic. Arpt., E. Boston, Mass. | Cabin | Jacobs 225 | 845 hr. | 213 hr. | 2175 |
| Aircraft Sales of Michigan, City Airport, Detroit, Mich. | UKC | Cont. 210 | 850 hr. | Just | 2150 |
| John P. Hall W Haven Arpt., West Haven, Conn. | YMF | Jacobs 225 | 710 hr. | 60 hr. | 2100 |
| J. L. Wells, 106 W. Main, Avon Park, Fla. | YKC | Jacobs 225 | 650 hr. | 200 hr. | 2000 |
| Page Airways, Inc., Munic. Airport, Rochester, New York | C | Cont. 210 | 1310 hr. | 24 hr. | 2000 |
| Bay State Flying Service, Framington Airport, Framington Mass. | Cabin UIC | Cont. 210 | 700 hr. | 60 since maior | 1950 |
| Southern Arwys. of Danville, Box 205, Danvilla, Va. | YKC | Jacobs 225 | 917 hr. | 550 hr. | 1850 |
| Greenville School of Avia., Treaty City Arpt., Greenville, Ohio. | Cabin | Cont. 210 | 850 hr. | 2/41 | 1750 |
| Harold W. Gruchy, 1326 Walnut St., Wenton Highlands, Mass. | UIC | Cont. 210 | 790 hr. | 46 hr. | 1600 |
| Capt. Arthur J. Davis, Box 446, East Lansing, Michigan. | RNF | Warner 125 | 500 hr. | 100 hr. | 1500 |
| Arthur J. Davis, E. Lansing, Mich. | CTO | Wright-7 | 780 hr. | Yes | 1500 |
| | | | | Approx. May 14 @500 | |
| Hawthorne Flying Service, Municipal Airport, Charleston, S. C. | '32 Cabin | Cont. 165 | 600 hr. | 500 hr. | 1295 |
| Leeward Aviation, New Kensington, Pa. | UIC | Cont. 210 | 850 hr. | 70 hr. | 1295 |
| Lynchburg Air Trans. and Sales Corp., Preston Gleen Airport Lynchburg, Va. | RNF | Warner 125 | 1173 hr. | 90 hr. | 1250 |
| Foster A. Lane, Port Columbus, Columbus, O. | INF | Kinner B5 125 h.p. | 1700 hr. | Just | 1250 |
| Shaw Aircraft Co., Munic. Arpt., Iowa City, Ia. | RNF | Warner 125 | 1000 hr. | 85 hr. | 1250 |
| J. A. Atherton, Box 608, Rochester, Minn. | RNF | Warner 125 | 400 hr. | | 1100 |
| Henry B. Chapman, N.O. Arpt., New Orleans, La. | RNF | Warner 125 | 720 hr. | 6 hr. | 1100 |
| Red Bank Airport, Inc., Red Bank, N. J. | ENF | Martin 120 | 575 hr. | 35 hr. | 1089 |
| Southern Air Serv., Memphis, Tenn. | | Warner 125 | 1000 hr. | Recently | 1050 |
| Jerry C. Gendron, 220 East Coolidge Avenue, Ironwood, Michigan | F | Warner Scarab 125 | 710 hr. | 250 hr. | 975 |
| Des Moines Flying Service, Inc., Municipal Airport, Des Moines, Ia. | RNF | Warner 125 | 710 hr. | 100 hr. | 950 |
| Arthur J. Davis, E. Lansing, Mich. | CTO | Wright J6-9 | 1200 hr. | | 900 |
| Mayes Feld, Huntington, W. Va. | RHF | Warner 125 | 1000 hr. | Recently | 900 |
| Howard G. Mayes, P.O. Box 2104, Huntington, W. Va. | F | Warner 125 | 1680 hr. | 292 hr. | 750 |

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